EPA/ROD/R03-93/166
1993

# EPA Superfund
# Record of Decision:

**OCCIDENTAL CHEMICAL CORP./FIRESTONE TIRE & RUBBER CO.**
**EPA ID: PAD980229298**
**OU 01**
**LOWER POTTSGROVE TOWNSHIP, PA**
**06/30/1993**

Text:
RECORD OF DECISION OCCIDENTAL CHEMICAL CORPORATION SITE

DECLARATION

SITE NAME AND LOCATION

Occidental Chemical Corporation Site
Lower Pottsgrove Township, Montgomery County, Pennsylvania

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Occidental Chemical Corporation Site, in Pottsgrove Township, Montgomery County, Pennsylvania, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for this Site.

The Commonwealth of Pennsylvania concurs with the selected remedy. The information supporting this remedial action decision is contained in the Administrative Record for this site.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The Occidental Chemical Corporation Site includes an active manufacturing facility approximately 250 acres in size. The remedial action selected for the Site is a final remedy which will address ground water contamination in the bedrock aquifer and contamination at the earthen lagoons. The selected remedial action includes the following components:

- Extraction and treatment of contaminated ground water combined with air stripping and carbon vapor adsorption throughout the entire plume of contamination and

- Long-term ground water monitoring throughout the entire plume

- Excavation of PVC material, coal fines layer and contaminated soil at the earthen lagoons

- Onsite Drying of PVC material and landfilling of the coal fines layer at the earthen lagoons

. Restoration of the earthen lagoon area to original grade.

. Additional sampling of sediment pond and drainage swale

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. Thisremedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as their principal element.

Because this remedy will result in hazardous substances remaining at the Site, a review by EPA will be conducted within five years after the initiation of the remedial action, and every five years thereafter, as required by Section 121 (c) of CERCLA, 42 U.S.C. 9621(c), to ensure that the remedial action continues to provide adequate protection of human health and the environment.

RECORD OF DECISION

OCCIDENTAL CHEMICAL CORPORATION SUPERFUND SITE

DECISION SUMMARY

TABLE OF CONTENTS

FIGURES AND TABLES

TABLES*

* Tables From Occidental RI/FS

THE DECISION SUMMARY

## I. SITE NAME, LOCATION, AND DESCRIPTION

The Occidental Chemical Corporation (OCC) Site (Site) is 1/2 mile southeast of the Borough of Pottstown, Montgomery County, Pennsylvania. The Schuylkill River surrounds the site on three sides forming the western, southern, and eastern boundaries. (See Figure 1). The Site contains an active polyvinyl chloride manufacturing plant. It consists of approximately 250 acres, which includes manufacturing, office, outdoor storage areas, and inactive manufacturing/storage building space. Paved parking areas, roadways, and open land comprise the remaining acreage.

The surrounding land use is agricultural, residential, areas of natural habitat, and commercial. The land use across the Schuylkill River is low density single family residential to the southeast and a township park lies to the southwest. Small commercial/industrial zones are also present across the river. Wooded lands adjoin the northwestern boundary of the Site and agricultural lands adjoin the northeastern portion at the Site. Commercial office buildings, a hotel, and restaurant lie north of the Site across Route 422. The Site is zoned for industrial land use in accordance with a Lower Pottsgrove Zoning Ordinance.

The location of the Site within a meander loop of the Schuylkill River provides a unique hydrologic setting. Because the Site is bounded by the river on three sides, surface drainage is generally outward to the river. The eastern portion of the Site is located within the 100 year floodplain of the Schuylkill River.

The Site consists of a closed seventeen acre solid waste landfill, a seven acre active industrial waste landfill, four inactive unlined earthen lagoons, two active lined lagoons, and the TCE Handling Area.

## II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

### A. BACKGROUND

Prior to the second World War this Site was owned by Jacobs Aircraft Engine Company (JAEC), which manufactured aircraft engines. The Defense Plant Corporation (DPC) purchased the Site from JAEC in 1942, JAEC continued to operate and manufacture aircraft engines for DPC until late 1944. In 1945, DPC leased the Site to Firestone Tire and Rubber (FTR), which subsequently purchased the Site in 1950. FTR manufactured tires

and polyvinyl chloride (PVC) resins at the Site. In 1980, FTR sold the Site to Hooker Chemicals and Plastics Corporation, which later became the Occidental Chemical Corporation (OCC). OCC continues to manufacture PVC at the Site today.

Past manufacturing operations at the Site have led to the release of hazardous substances into the environment. The Site includes the following:

(See Figure 2)

A 17 acre solid waste landfill was in operation from approximately 1942 through 1985. The landfill is approximately 1,700 feet long and ranges in width from 360 to 650 feet. Fly ash, carbon black, tire plant wastes, wood pallets, paper, cardboard, PVC sludge, and PVC scraps were reportedly disposed in the landfill during its operation. In 1973, the Pennsylvania Department of Environmental Resources (PADER) issued a permit to FTR allowing them to continue to operate the solid waste landfill. The landfill is located in the plant manufacturing area of the Site. In 1977, FTR applied for a permit to expand the landfill. One important technical feature required by PADER when the permit was revised was to insist that the existing plant production wells be pumped continuously to act as a contingent leachate collection system. In this system,the process wells continuously pump the bedrock groundwater to the surface for use in the production process. This leachate control system, still in operation today, controls the direction of the bedrock groundwater flow towards the center of the site which acts to contain the contaminant plumes preventing a release to the adjacent river or groundwater. (See Figure 3)

In 1985, the landfill was closed and capped with a impermeable synthetic liner system in accordance with a Closure Plan approved by PADER. A monitoring well network was also installed to comply with quarterly groundwater monitoring requirements for the closed landfill.

In addition to the closed landfill, a 7 acre active industrial waste landfill is present at the Site. This landfill is currently operated by OCC under a permit issued by PADER in 1977 (Permit No. 300001). The active landfill is permitted and operated as an industrial solid waste disposal facility. It is located east of the 17 acre closed landfill. An active sedimentation basin is located northeast of the active landfill face. This landfill is approximately 1,000 feet long, 300 feet wide, and rises approximately 30 feet above the floodplain. It has a drainage swale which parallels the base of the landfill and carries surface water runoff from the landfill to a sediment settling basin. The active landfill and sediment settling basin are unlined.

Four inactive unlined earthen lagoons are also present on the Site. These lagoons were used for the storage of PVC sludge

until 1974 when PADER ordered Firestone to discontinue the use of these lagoons. The lagoons have not been formally decommissioned but no further disposal of material in the earthen lagoons has occurred since 1974.

Throughout the operation of the now inactive earthen lagoons,sludge was first allowed to settle in the concrete holding basins located at the rear of the wastewater treatment plant prior to being sent to the lagoons. Unpolymerized PVC solids settled to the bottom of the basins. The supernatant water was skimmed off and sent directly to the Pottstown publicly owned treatment works (POTW). When a basin neared capacity the PVC sludge was diverted to the northern most lagoon (Lagoon #1). Sludge from the earthen lagoons was periodically removed and placed in the closed landfill when a lagoon reached capacity (approximately 15 feet deep). Firestone discontinued the use of the lagoons in 1974 when two lined lagoons were constructed to handle the waste. The earthen lagoons and their PVC contents were left in place.

The two active lined lagoons currently hold polyvinyl chloride (PVC) sludge which is recycled into the manufacturing process and resold as low grade PVC product. The lagoons are lined with a synthetic liner to prevent migration of chemicals into the subsurface. The liner is constructed of ethylene propylene diene monomer (EPDM). Until about 1987, PVC sludge was sent to these lagoons in the same manner as the sludge sent to the earthen lagoons. By September 1987, PVC sludge from the plant and that stored in the lined lagoons was being reclaimed. The spent PVC solids and liquid mixture is currently centrifuged to separate as much solid material as possible for recycling. The liquid is sent directly to the Pottstown POTW. The solids are mixed with chemicals to slurry the mixture for transport to a spray dryer for drying and subsequent packaging for resale.

Until 1990, the PVC sludge held in the lagoons was not a listed hazardous substance. On September 25, 1990, EPA expanded its list of hazardous waste to include some organic compounds. This list included Vinyl Chloride Monomer. Therefore, due to the change in waste classification, the active lined lagoons became subject to stricter regulatory requirements. Therefore,these lagoons must either be upgraded or closed. OCC has submitted a plan to close the lagoons. OCC is required to begin closure by March 1994. The plan is currently under review and must be approved by the U.S. EPA and PADER.

In addition to the above disposal areas, trichloroethylene (TCE) was used in the manufacturing process from the late 1940's until 1987. TCE was brought to the Site in railroad tank cars and was unloaded via pumping to a holding tank. The holding tank was located above ground and situated in a bermed retention basin where TCE was stored before its use in the PVC manufacturing process. TCE was added to the plant process water used in the PVC reactors. The bulk of TCE combined with the PVC resin. The spent reactor waste waters were then sent to an on-site industrial pretreatment system before being pumped to the Pottstown POTW. Over the years the TCE transfer process from tank car to holding tank resulted in releases of TCE into the soils. (i.e. spills)

From 1979 through 1983, Firestone and OCC sampled and analyzed process water wells to determine if TCE had migrated from the unloading area through the overburden soils and into the groundwater via fractures in the underlying bedrock. Analytical results revealed the presence of TCE in these wells at concentrations which exceeded the maximum level allowed (5 ppb TCE) by the Safe Drinking Water Act. The highest concentrations were detected in the TCE handling area of the site where concentrations ranged from 10 to 295 ppb. In early 1984, approximately 898 tons of soil contaminated with TCE was removed from the TCE handling area and disposed of off-site. The removal of the contaminated soil reduced the movement of TCE from the soil to the groundwater.

B. INCLUSION ON THE NATIONAL PRIORITIES LIST

In 1985, The United States Environmental Protection Agency, Region III investigated the Site to characterize existing Site conditions. Groundwater and sediment samples were collected and analyzed. The Site was evaluated by EPA in 1988 using the Hazard Ranking System. The score was 45.91 and the OCC Site was placed on the National Priorities List (NPL) of Superfund Sites. EPA's evaluation identified the primary concern at the Site as the presence of several volatile organic compounds ("VOCs") in the groundwater. The EPA investigation identified TCE, trans-1,2-dichloroethene (1,2-DCE), and vinyl chloride monomer (VCM) as primary chemicals of concern.

C. HISTORY OF CERCLA ENFORCEMENT ACTIVITIES

In December of 1989, EPA negotiated and the Regional Administrator signed an Administrative Order on Consent ("Consent Order") with the active owner and operator, OCC (Docket No. III-89-20-DC). Under the terms of the Consent Order, OCC conducted a site-wide Remedial Investigation / Feasibility Study (RI/FS) for the Site. The RI/FS, conducted between 1990 and 1993 has recently been completed and approved by EPA.

Since December 1989, EPA has continued to investigate and gather information on additional potentially responsible parties and has sent general notice of potential liability to the following parties: Bridgestone/Firestone Incorporated and General Services Administration (GSA).

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

The public participation requirements of Sections 113(k) (2) (B) (i-v) and 117 of CERCLA have been met in this remedy selection process. A newspaper advertisement was published in The Mercury, Pottstown, PA, on Wednesday, April 20, 1993. It specified the availability of the Proposed Remedial Action Plan (PRAP), the duration of the public comment period, and the location of the administrative record file which contains the Final RI/FS.

The public comment period began on April 20, 1993 and ended on May 19, 1993. A public meeting was conducted on May 4, 1993, at the Pottstown Senior Center. Approximately 25 people attended, including Occidental Chemical employees, residents of the area, and staff from EPA Region III and PADER.

IV. SCOPE AND ROLE OF RESPONSE ACTION

This final remedy selects a Remedial Action to address the threats posed by the release of hazardous substances at the Site. The principal threat posed by the Site is the groundwater contamination which resulted from the former TCE handling operation. The concentrations of chemicals in the five contaminant plumes exceed the Maximum Contaminant Level (MCLs) allowed by the Public Health Services Act, 42 U.S.C. 300 (f) to 300 (j-26). In addition, EPA plans to remediate the inactive earthen lagoons. This remedial action will address the bedrock groundwater contamination and the inactive earthen lagoons.

Specific objectives for the site cleanup are to:

1. Restore groundwater in the bedrock aquifer to Federal and State Applicable, Relevant, and Appropriate Requirements (ARARs), including drinking water standards, and to a level that is protective of human health and the environment.

2. Protect non-impacted groundwater and surface water for current and future use.

3. To prevent migration of chemicals from the earthen lagoons to groundwater or to surface water, and to prevent direct contact with lagoon material.

The active lined lagoons are being addressed by RCRA under its closure regulations and the 7 acre active industrial solid waste landfill is currently operating in accordance with a permit issued by PADER. These two areas will not be addressed by this action.

## V. SUMMARY OF SITE CHARACTERISTICS

The Remedial Investigation/Feasibility Study (RI/FS) for the Occidental Chemical Site was conducted by Occidental Chemical Corporation between 1990-1993. The data obtained have been used to evaluate chemical migration routes and risks to public health or the environment. The primary focus of the RI/FS was to determine the extent and fate of chemicals at the Site, particularly TCE in the bedrock aquifer. The RI has also involved site characterization sampling of the alluvial soils and groundwater; Schuylkill River surface water and sediment, storm water sewer outfalls surface water and sediment, surface water and sediment from the sediment pond drainage swale, soil and sediment from the earthen and lined lagoons, and background soil samples. The ecological investigation included wetlands delineation, plant community delineation, wildlife and habitat surveys, and a receptor evaluation.

### A. REGIONAL SETTING, SOILS, GEOLOGY

#### 1. Regional Setting

The Site lies within the Triassic Lowland Section of the Piedmont Upland Physiographic Province. The Triassic Lowlands are characterized by gently rolling hills formed by the erosion of sandstone and shale. These hills have a topographic relief of approximately 100 to 200 feet and gently slope to low lying floodplain areas along the Schuylkill River which are at an elevation of approximately 120 feet above mean sea level along the Site boundary. The Site is located within the meander loop of the Schuylkill River. Several communities utilize the river for public water supplies. The nearest downstream public withdrawal is owned by the Citizens Utilities Home Water Company which serves sections of East Pikeland and East Vincent in Chester County and the Borough of Spring City in Montgomery County. Citizen Utilities is allocated 5 million gallons per day from the river and the intake for water supply is located approximately 3.5 miles downstream of the Site.

The results of an inventory of existing wells within a 2-mile radius identified 26 wells. None of these wells are within 1/2 mile, 22 of the wellsare residential and are at a distance of 1/2 to 1 mile of the Site. The other 4 wells are non-residential wells located 1 to 2 miles from the Site. None of the wells identified in the survey have been affected by the Site. The plant production well network maintains a radially inward gradient to the center of the Site which prevents off-site migration of contaminants.

## 2. Soils

The surface soils beneath the developed portion of the Site have been substantially altered by construction activity since the early 1940's. Both cut and fill activities have occurred in the active plant area; therefore characterization of soil depths and nature of the materials is difficult.

The Soil Conservation Service identified two types of "Made Land" at the Site and one naturally occurring soil, the Rowland silt loam. This soil type is found in the floodplain of the Schuylkill River. The soil has a dark gray to black layer of silt loam 1 to 3 feet thick. It is the result of the deposition of coal fines transported via the river from the anthracite region farther to the north (upstream).

## 3. Geology

### Bedrock Aquifer Geology

The geology underlying the Site consists of two formations of Triassic age: the Brunswick Formation and the Lockatong Formation. A portion of the Site is mantled by river alluvium. According to the "Groundwater Resources of the Brunswick Formation in Montgomery and Berks Counties, Pennsylvania" (Longwill and Wood, 1965), the Brunswick Formation consists of thin to medium bedded, reddish-brown shale, mudstone, and siltstone. The Lockatong Formation consists of predominantly massively bedded, medium to dark gray argillite, interbedded with thin beds of gray to black shale, siltsone, and marlstone. Plate 1 of the 1965 Longwill and Wood publication shows two intertongues of Lockatong Argillite in the Brunswick Formation at the site, which are approximately 300 feet wide in outcrop and are separated by approximately 400 feet. The Longwill and Wood map also indicate that formations strike 80 east, with the bedding planes dipping from about 13 to 18 toward the north. Jointing is abundant and nearly vertical in the bedrock. The Lockatong Formation is more massive, with fewer joint sets than the Brunswick Formation. One well-developed joint set and two less abundant sets exist in the Brunswick, with orientations measured at north 30 east, north 75 east, and north 45 west, respectively (Longwill and Wood, 1965)

A fracture trace analysis in the immediate vicinity of the Site reveals somewhat different local orientations than that characterized in the regional hydrogeologic appraisal. Fractures that may exist beneath the physical plant and the floodplain were not apparent because bedrock fractures do not normally show through disturbed land or under sediment veneers. The majority of the mapped fractures were approximately perpendicular to bedding; orientations ranged from north-south to north 20 west. A few fractures were sub-parallel to bedding strike including two which were observed on the northern part of the property in an undeveloped area as of 1959. The topography to the north and northwest of the plant shows surface drainage generally parallel to bedrock strike into either the Schuylkill River or Sprogles Run, a clearly joint-controlled stream bed east of Pottstown and oriented nearly north-south.

A hydrogeologic study at the Site in 1976 investigated the properties of river alluvium. The alluvium ranges in thickness from 9 to 20 feet thick and overlies a river cut terrace in the bedrock on the southeastern half of the Site. A sand and gravel zone ranging from 0.5 to 15 feet thick, with a 5.5. foot average thickness, occurs directly above the weathered, silty shale fragmented bedrock. The remainder of the Site is covered with weathered siltstone andshale regolith which is 6 to 10 feet thick.

Overburden Aquifer Geology

The overburden soils at the Site consist of alluvium, fill, and weathered bedrock. The results of the RI indicate that the alluvium is not continuous beneath the plant area and that an overburden of mainly fill material overlies the bedrock in the developed areas of the site.

Boring logs in the vicinity of the lined lagoons indicate that the alluvium in this area is 4 to 10 feet thick, largely unsaturated, and consists of black topsoil or coal fines, orange-brown, silt, and a sandy gravel overlying weathered bedrock layer. The alluvial deposits extend to the approximate boundary of the floodplain, but the alluvium is dry over much of this area.

The overburden in the vicinity of the plant area is 8 to 11 feet thick and consists of silty sand fill with some gravel and cobbles. The overburden beneath the plant area is also largely unsaturated with the exception of a perched water zone in the vicinity of the concrete basins of the wastewater treatment plant.

B. NATURE AND EXTENT OF CONTAMINATION

The Remedial Investigation into the nature and extent of contamination occurred from late 1990 through 1991. A summary of results of the physical and chemical characterization of the Site is shown below:

Data Evaluation: The chemical data was validated to identify cases where reported concentrations may be inaccurate (estimated concentration) or where chemicals may not have been present in the sample when it was collected (suspect data). Data validation also identifies chemical concentrations which are below the level which can be measured accurately. These data are referred to as "estimated" concentrations and are qualified as such when the concentration of chemical is below a level which can be measured accurately (quantification limit) but above a level that can be detected (detection limit).

Blank samples prepared in the field or laboratory were also analyzed. Chemicals detected in the field blank indicate that contamination was introduced into the sample during sampling procedures in the field while chemicals detected in the laboratory blanks indicate that contamination was introduced into the sample at the laboratory. Detection of chemicals in either type of sample is therefore considered suspect. However, this data is still reviewed during data validation and flagged for its useability. Data were considered suspect when sample concentrations were within a factor of 10 of the blank concentration for the following laboratory chemicals: methylene chloride, toluene, acetone, phthalate ester, and methanol. For any other compounds detected in a related blank, a factor of 5 was used to define suspect data.

EPA Region III, Central Regional Laboratory (CRL) provides a data validation oversight process to ensure that the validation of the analytical results was properly performed. CRL examined the technical adequacy of the review (i.e. were proper protocols used and correctly applied), application of data qualifiers, and accuracy of data transcription. CRL's review indicates that the validation was done correctly for this Site.

Bedrock Groundwater

. Groundwater flow in the bedrock is controlled primarily by fractures in the rock and the types of rock comprising the aquifer; the sandstone units in the bedrock are more permeable than the shale and siltstone.

. The gradient in the bedrock aquifer is from the Schuylkill River radially inward to the center of the Site; this is an induced gradient resulting from the continual pumping of plant production wells near the center of the Site.

. There are no off-site wells hydraulically downgradient of the Site as a result of the induced gradient. A well inventory indicates that are no residential wells within a 1/2 mile radius of the Site.

. In the production area of the Site, unsaturated conditions predominate in the overburden. East of the production area, an overburden (alluvial) aquifer is present under portions of the floodplain.

. As a result of groundwater sampling, five volatile organic compounds are the identified chemicals of concern in the groundwater, and the extent of each (both in area and depth) varies. (See Figure 4 for well locations) Concentrations of these five VOCs in ground water at the Site exceed the EPA maximum contaminant levels (MCLs) for those compounds in drinking water. These compounds are trichloroethylene (TCE), trans-1,2-dichloroethene (trans-1,2-DCE), vinyl chloride monomer (VCM), styrene, and ethylbenzene. The RI/FS estimates the TCE plume to have a volume of 258 million cubic feet. The ethylbenzene plume is estimated at 38 million cubic feet, the VCM plume is estimated 22 million cubic feet, the trans-1,2-DCE plume is estimated at 20 million cubic feet, and the styrene plume is estimated at 13 million cubic feet. Figure 5 depicts the aerial extent of the TCE contaminant plume which is the largest of the five plumes. Groundwater is contaminated to depths as great as 582 feet, although concentrations of TCE and other VOCs are generally the greatest within 200 feet of the land surface near the former TCE handling area. In earlier investigations, the soil and shallow bedrock had been shown to be contaminated by TCE (monitoring wells were drilled to depths of 125 feet or less), but TCE was present in production wells that are as deep as 440 feet. In the RI, discrete zones to depths as great as 582 feet were sampled using packer tests in 10 additional deep bedrock monitoring wells drilled for the RI. Concentrations of TCE in ground water as great as 91 mg/L were measured from producing zones near 77 feet below land surface of one reconnaissance bedrock well (TB-3). Although greatest ground water concentrations of TCE were from zones in the upper 200 feet of the aquifer, TCE concentrations of 3 mg/L were measured in water from a zone 500 feet below land surface in a well (TB-1).

Overburden Groundwater

- Groundwater flow in the alluvial aquifer appears to discharge to the Schuylkill River under natural conditions. Under pumping conditions, the groundwater flow appears also to discharge to the Schuylkill River for the majority of the Site. (See Figure 6) Water level measurements located in the vicinity of the lined lagoons are often dry. This may indicate that the alluvial aquifer in this area recharges the shallow bedrock aquifer due to imposed pumping stresses. This is supported by the presence of more permeable sandstone units intercepting the alluvial aquifer at this portion of the Site.

- The original sampling program included 11 wells, but 3 were dry. The sampling results include analyses from 6 overburden and 2 shallow bedrock monitoring wells.

The overburden groundwater was analyzed for volatiles, semivolatiles, PCBs, pesticides, and metals. Volatile compounds were not detected atconcentrations above their respective MCLs. Ethylbenzene, styrene, and toluene were detected in a few samples but their presence is suspect due to their presence in laboratory blanks.

Semi-volatile compounds were detected in the overburden aquifer. Benzoic acid was detected in OW-19 at an estimated concentration of 2 ug/l. Bis(2-ethylhexyl) phthalate was detected in the same well at an estimated concentration of 310 ug/l. Butylbenzyl phthalate and di-n-octyl phthalate were also detected in OW-19 at estimated concentrations of 3 ug/l and 4 ug/l.

No PCBs or pesticides were detected in the samples.

Six overburden wells were analyzed for metals. Detected concentrations were below background except for iron (OW1-2) and manganese (OW-12 and OW-24A).

Schuylkill River

- Twelve surface water samples and one duplicate were collected from the river. (See Figure 7) No volatiles were detected which could be positively attributed to the field samples. Five compounds, including common laboratory chemicals were reported in a few samples and also in associated blanks; therefore, their presence in the field samples is considered suspect. Acid extractable compounds were not detected in any of the samples. Bis(2-ethylhexyl) phthalate was detected in all samples, but was considered suspect due to the presence of this compound in the associated blanks. The results of the metals analyses indicate that most metals were either not detected or were present at concentrations below background surface water levels.

- Sediment sampling revealed that volatiles were present but were also detected in the associated blanks. Acid extractable compounds were not detected in any of the samples. Base neutral compounds were not detected in any of the samples above background with the exception of one sample. Butylbenzylphthalate was not detected in the background sediment but was detected in 2 samples at estimated concentrations of 300 ppb and 160 ppb. The majority of the samples contained low levels of polycyclic aromatic hydrocarbons (PAHs).

Metals were generally not detected above background sediment concentrations with the exception of SR-4-SED. This sample contained 7 metals above background sediment levels: chromium (140 mg/kg), cobalt (68 mg/kg), copper (230 mg/kg), lead (260 mg/kg), manganese (2,400 mg/kg), nickel (110 mg/kg), and zinc (500 mg/kg).

Storm Water Sewer Outfalls

- Outfall Surface Water

No VOCs were detected in the southern storm water outfall sample. (See Figure 8) Four volatiles (1,2-DCE, acetone, total xylenes, and TCE) were detected in either the field sample or field duplicate sample collected from the northern storm sewer outfall. Acetone was the only compound that was common to both the sample and the field duplicate. Acetone was detected at a concentration of 1,000 ug/l in the sample (NSO-1) and at a concentration of 52 ug/1 in the duplicate sample (NSO-1A). TCE and 1,2-DCE were detected in the northern outfall sample at concentrations of 7 ug/l and 2 ug/l, respectively, but were not detected in the field duplicate sample. Total xylenes were detected in the northern storm sewer field duplicate sample (NSO-1A) at an estimated concentration of 2 ug/l, but were not detected in the sample (NSO1).

No SVOCs were detected at concentrations which could be positively attributed to the field samples. Bis(2-ethylhexyl) phthalate was detected in allsamples at concentrations ranging from 2 ug/l to 3 ug/l.

Most metals were either not detected or present at concentrations below background surface water levels.

- Outfall Sediment

Two sediment samples and 1 field duplicate were collected below the storm sewer outfalls.

The field duplicate contained an estimated 8 ug/kg of 1,2-DCE, but 1,2-DCE was not detected in the field Sample. VCM was detected in Sample NSO1-SED at an estimated concentration of 5 ug/kg. Acetone and 1,1,1-TCA were also detected in the sediment samples.

One acid extractable compound, 4-methylphenol (p-Cresol), was detected in the northern storm water outfall sediment sample at an estimated concentration of 170 ug/kg, but was not detected in the field duplicate sample from this location. Polycyclic Aromatic Hydrocarbons (PAHs) and phthalates were detected in the sediment samples. A total of 13 PAHs were detected in the northern storm sewer samples with a total PAH concentration of 5,800 ug/kg. A total of 10 PAHs were detected in the field duplicate from this location with a total PAH concentration of 5,500 ug/kg.

The sample from the southern storm sewer contained 5 PAHs and had a total PAH concentration of 1,700 ug/kg. The PAHs common to both the NSO-1SED and SSO-1-SED samples and their range of corresponding of concentration are: benzo(a)anthracene (180-530 ug/kg), chrysene (270-600 ug/kg), fluoranthene (500-860 ug/kg), phenanthrene (350-820 ug/kg), and pyrene (440-870 ug/kg).

The 2 phthalates detected in the samples were bis(2-ethylhexyl) phthalate and di-n-octyl-phthalate. Bis(2-ethyhexyl) phthalate was detected in samples SSO-1-SED and NSO-1-SED at concentrations of 11,000 ug/kg and 6,200 ug/kg, respectively. Di-n-octyl phthalate was detected in the northern storm sewer outfall (NSO-1-SED) sample at a concentration of 250 ug/kg, but was not detected in the field duplicate from this location or in the southern storm sewer outfall sample.

Most metals were either not detected or were present at concentrations below background sediment levels.

The metals above background levels were detected in the NSO-1 sample at the following concentrations: cadmium (15 mg/kg), calcium (3800 mg/kg), chromium (120 Mg/kg), mercury (0.54 mg/kg), copper 83 mg/kg) and zinc (290 mg/kg).

Sediment Pond and Drainage Swale

- Drainage Swale Surface Water

Three samples and 1 duplicate samples were collected from the sediment pond discharge swale. (See Figure 9)

The following 7 volatiles were detected in the surface water samples: 2-butanone (MEK), 4-methyl-2-pentanone (MIBK), carbon disulfide, Vinyl Chloride Monomer (VCM), acetone, methylene chloride, and toluene. In general, the surface water sample (SW-1) collected below the sediment pond discharge pipe contained the highest concentrations and the large number of volatiles.

VCM and MEK were detected in SW-1-SW at concentrations of 6 ug/l and 20 ug/l, respectively. MIBK was detected at a concentration of 110 ug/l in SW-1-SW. Carbon disulfide was detected in the field duplicate SW-2A at an estimated concentration of 4 ug/l, but was not detected in the corresponding field Sample SW-2.

Two acid extractable compounds and 2 phthalate esters were detected in the surface water samples. Benzoic acid and phenols were detected in sample SW-1 at estimated concentrations of 43 ug/l and 4 ug/l, respectively. Din-octyl phthalate was detected in the SW-1 sample at an estimated concentration of 4 ug/l. All of the samples contained bis-(2-ethylhexyl) phthalate; however, the presence of this compound was considered suspect due to its presence in the blank.

Most metals were either not detected or were not present at concentrations above background surface water levels. Metals detected in SW-1 above background levels and the corresponding concentrations are as follows: calcium (33 mg/l), manganese (1.1 mg/l) potassium (5.4 mg/l), selenium (1.001 mg/l) and zinc (0.29 mg/l). Aluminum (2.9 mg/l), and iron 2.8 mg/l) were detected at concentrations above background in sample SW-3.

. Drainage Swale Sediment

Nine VOCs were detected in the samples. Two VOCs (VCM and ethylbenzene) were detected in the sediment pond sample at estimated concentrations of 93 ug/kg and 8 ug/kg, respectively. TCE was detected in 4 of 10 of the sample, 2 of which were collected in the low lying area at the base of the sediment pond and the other 2

were collected in the drainage swale within 400 feet of the sediment pond discharge pipe. The maximum TCE concentration was estimated at 19 ug/kg detected in sample SW-4-SED. The results indicate that the VOCs are mainly associated with the sediment pond sample (SW-1) and the SW-5) immediately below the sediment pond discharge pipe.

One acid extractable compound (benzoic acid) was detected in 5 of 11 samples at concentrations ranging from 490 ug/kg to a maximum of 16,000 ug/kg at SW-1. The samples containing benzoic acid were confined to the sediment pond and the soils at the base of the sediment pond. Dibenzofuran was detected in 2 samples, at estimated concentrations of 61 ug/kg and 1,300 ug/kg, respectively. Other SVOCs detected in the sediments and soils include phthalates and PAHs. The greatest variety and highest concentrations of phthalates and PAHs were associated with the sediment pond sample (SW-1) and the swale sample (SW-5) immediately below the sediment pond discharge pipe. Fewer compounds and generally lower concentrations were detected in the sediment samples collected downstream of the SW-5 sample location.

The four phthalates detected in the sediments and soils were bis(2ethylhexyl) phthalate, butyl benzyl phthalate, di-n-butyl phthalate, and di-noctyl phthalate. Bis(2-ethylhexyl) phthalate was detected in all samples at estimated concentrations ranging from 690 ug/kg to 55,000 ug/kg. The 2 highest concentrations were detected in samples Sw-1 SED and SW-5-SED at 22,000 ug/kg and 55,000 ug/kg, respectively. Butyl benzyl phthalate was detected at concentrations ranging from 100 ug/kg to 3,000 ug/kg with the concentrations over 500 ug/kg detected at SW-1 (510 ug/kg) SW-3 (3,000 ug/kg), SW5 (860 ug/kg) and SW-7 (560 ug/kg). Di-n-butyl phthalate was detected in 3 of 11 samples at concentrations ranging from 56 ug/kg to a maximum concentration of 290 ug/kg, detected at SW-1. Di-n-octyl phthalate was detected in 30 of 10 samples which ranged in concentration from 130 ug/kg to 5,200 ug/kg.

PAHs were detected in all samples except SW-6, although several PAHs were detected at low concentrations in the field duplicate from this location. The greatest number of PAHs were detected in samples SW-2 through SW-5 at concentrations of total PAHs ranging from 3300 ug/kg to 99,000 ug/kg. The main PAHs detected in the samples included chrysene, fluoranthene, phenanthrene, and pyrene. The highest concentrations of total PAHs were detected in samples SW-5 (99,000 ug/kg), SW-3 (7,500 ug/kg), SW-4 (5,000 ug/kg), and SW-7 (5,020 ug/kg).

PCB-1254 was detected at an estimated concentration of 740 ug/kg atSW-10. Pesticides and herbicides were not detected.

Various metals were detected at concentrations in excess of background concentrations for sediment.

Arsenic was above background at the following locations: SW-1 (22 ug/kg), SW-3 (55 ug/kg), and SW-7 (250 ug/kg). Chromium was detected at concentrations above background in 2 samples (SW-5 and SW-7) at concentrations of 110 mg/kg and 130 mg/kg, respectively. Concentrations of cobalt above background were detected in 2 samples SW-8: (40 mg/kg), and SW -10 (69 mg/kg). Nickel was also detected at these locations at concentrations of 62 mg/kg (SW-8) and 86 mg/kg (SW-10). Zinc was detected at concentrations in excess of the background soils in SW-5 (490 mg/kg) and SW-7 (530 mg/kg).

Borrow Area Sediment

Two VOCs (TCA and 1,2-DCE) were present at trace concentrations in two sediment samples. (See Figure 10) Total xylenes, methylene chloride, acetone, and toluene were also detected in the sediments.

Acid extractable compounds were not detected in the samples. Fluoranthene and pyrene were detected in Sample B-2 at estimated concentrations of 210 ug/kg and 190 ug/kg, respectively. These concentrations are below those detected in background soil samples. Polynuclear aromatic hydrocarbons were not detected in any of the other samples.

No PCBs and pesticides were detected in any of the sediment samples.

Most of the metals were either not detected in the sample or were present at concentrations below background soil levels.

Plant Area Soils

The 5 VOCs detected above background soil concentrations were: 1,1,1-TCA, TCE, 1,2-DCE, toluene, and 2-butanone (MEK). 1,1,1-TCA was detected in 1

sample from the 8- to 10-foot interval of boring SB-2 at a concentration of 6 u/kg. TCE was detected in all 12 samples. The TCE concentrations ranged from 1 ug/kg to 3,900 ug/kg with the maximum concentrations detected at the 0- to 2-foot interval of boring SB-7. (See Figure 11) In general, the TCE concentrations were higher in the lowest sample interval of each test boring. The analyses detected 1,2-DCE in 11 samples. The range of 1,2-DCE concentration detected was 3 ug/l to a maximum of 200 ug/l detected in the sample from the 6- to 8-foot interval of boring SB-6. In general, the higher concentration of 1,2-DCE ranging from 100 to 200 ug/l were also detected in the samples from the lower depth intervals of each boring.

MEK was detected in 3 samples at concentration of 77 ug/kg in the 8-10 foot interval of boring B-7, 820 ug/kg in the 8-10 foot interval of SB6, and 860 ug/kg in the 8-10 foot interval of SB-4. Toluene was reported in all 12 field samples but the presence of toluene is suspect due to its presence in the associated blanks.

Lined Lagoon Soils

. Soil samples were collected from five test borings around the lined lagoons. The total volatile concentration of samples ranged from below the detection limit to a maximum of 150 ppb. (See Figure 12) The 9 volatile compounds detected above background concentrations are: TCE, 1,2-DCE, 1,1-DCE, 1,2,1-TCA, carbon disulfide, ethylbenzene, toluene, xylene, and MIBK. TCE was detected in 5 of 9 samples at concentrations ranging from 2 ug/kg to a maximum of 88 mg/kg.

. Semi-volatiles: Benzoic acid was detected in 6 of 9 samples. The concentrations ranged from 61 ug/kg to 2300 ug/kg. The base neutral analysis detected 3 phthalates and 8 polynuclear aromatichydrocarbons (PAHs). The phthalates detected include bis(2ethylhexyl) phthalate, butyl benzyl phthalate, and di-n-butyl phthalate. The concentrations of bis(2-ethylhexyl) phthalate ranged from 75 ug/kg to a maximum of 4200 ug/kg. Butyl benzyl phthalate was detected in 1 sample at a concentration of 470 ug/kg. Di-n-butyl phthalate was detected in 4 of 9 samples with estimated concentrations between 40 ug/kg and 190 ug/kg.

. No PCBs or pesticides were detected in the samples.

. Three metals, arsenic, cadmium, and mercury were detected above background soil concentrations.

Inactive Earthen Lagoons

. The earthen lagoons are located in the 100-year floodplain of the Schuylkill River. Each lagoon is generally composed of three layers; a white, wet material, a gray to black wet material, and a coal fines layer. The white and gray materials are products of the PVC manufacturing process and will be referred to in this document as PVC material. The total volume of material in the four lagoons is approximately 38,000 cubic yards. The RI also revealed that the coal fine material is not present at the bottom of Lagoon 1. At Lagoons 2,3, and 4, it appears that the coal fine material has served as a collection/adsorption layer for the chemicals. It is believed that the soil beneath the coal fine layer of Lagoons 2, 3, and 4 has not been affected.

. In the area of Lagoon #1 which lacks the bottom coal fine layer, soil sampling reveals contaminants are present in the soilsdirectly beneath the lagoons. The contaminants present in the soils are those that are present in the lagoon material.

. Soil sampling conducted during the RI detected the presence of volatile and semi-volatile organic compounds in the material contained in the four inactive earthen lagoons. (See Figure 13) The chemicals present are the result of the PVC manufacturing process. In general, the total volatile organic concentration (TVO) is less than 1,000 ppb. Lagoon #1 is the noted exception, where the PVC sludge material at a depth of 6 feet has a TVO concentrations of approximately 24,000 ppb, and the underlying soil has a TVO concentration of approximately 720 ppb.

- The semi-volatile organic compounds detected are those associated with the process of making PVC. Benzoic acid and bis (2ethylhexyl) phthalate are the compounds present. The concentration of benzoic acid detected in the samples ranged from 1,600 ppb to a maximum of 31,000 ppb. The concentration of bis (2-ethylhexyl) phthalate ranges from 1,100 ppb to a maximum of 280,000 ppb. The semivolatiles appear to be more concentrated in the upper 4 feet of material in each lagoon.

- There were no PCBs detected in any of the samples. Pesticides were not detected in 3 of the 4 lagoons. Three pesticides were detected in Lagoon #1 samples at concentrations less than 1 ppm.

- The metal concentrations are not notably different in the lagoon material than they are in the underlying soils. The concentrations in both materials vary widely.

## VI. SUMMARY OF SITE RISKS

The Baseline Risk Assessment (BRA) provides the basis for taking action and indicates the exposure pathways that need to be addressed by the remedial action. It serves as a baseline indicating what risks would exist if no action were taken at the Site. This section of the ROD reports the results of the baseline risk assessment which was completed by Occidental Chemical Corporation in March 1992 for the Site. In accordance with OSWER Directive No. 9835.15 (8/28/90), EPA has determined that the final human health risk assessment has been reviewed independently by the Agency and has found that the human health risk assessment is fully acceptable. The OSWER policy and EPA Certification of the BRA can be found in the Administrative Record for the Site.

### A. Human Health Risks

#### (1) Identification of Contaminants of Concern

Analytical data collected during the RI sampling were reviewed to develop initial lists of Chemicals of Potential Concern (COPC) in each of the following environmental media: bedrock groundwater, overburden groundwater, earthen lagoon soil/sediments, lined lagoon soil, borrow area soil/sediment, drainage swale sediment, storm drain sediment, UST area 4 soils, plant area soils, drainage swale and storm sewer surface water runoff. Each area was considered separately. Chemicals were eliminated from further consideration as COPCs when one or more of the following applied:

1. The chemical was not detected in any sample.

2. The chemical was detected at concentrations below five times the amount detected in an associated blank (data validation qualifier "b") in each

sample.

3. The maximum value of the chemical was less than the maximum detected background value.

4. The maximum levels of the chemical in groundwater and surfacewater runoff was less than or equal to the MCL.

5. EPA-verified toxicity values (e.g. RfDs, RfCs, slope factors, unit risks) were not available for the chemical. Most chemicals eliminated by this criterion are believed to exhibit minimal human health toxicity (e.g. calcium, magnesium). The shaded chemicals outlined on Tables 1 through 11 list the identified COPC for each area investigated. All chemicals detected in site samples were initially considered to be chemicals of potential concern. Compounds were then screened by comparison of on-site concentrations to background and Maximum Contaminant Levels (MCLs). Some chemicals for which there were no EPA verified toxicity values were included using data verified by EPA Environmental Criteria Office (ECAO). Other toxicity values were developed using adjusted oral data. (See Tables 11-14 for toxicity data)

Despite these criteria, the EPA Risk Assessor takes into account that there may be exceptions to the above criteria and in those instances would retain the chemicals for further consideration.

(2) Exposure Assessment Summary

The exposure assessment identifies actual or potential pathways for human exposure to the contaminants of concern present in the impacted media at the Site. Exposure pathways are assessed based on two scenarios: current land use and future land use. The property comprising the site is currently zoned for industrial land use.

a. Potentially Exposed Human Populations

Based on the current and potential future land use of the Site, the following subpopulations were identified:

Current Land Use - On-site Workers
- Swimmers (Schuylkill River)

Future Land Use - On-site Residents
- On-site Workers
- Swimmers (Schuylkill River)

A summary of migration pathways and receptors is provided on Table 15.

b. Chemical Exposure Pathways

In order for one of the subpopulations identified above to be exposed to the chemicals of concern at the Site a chemical exposure pathway mustbe present. A pathway is the route taken by a chemical from its source in the environment until it contacts a receptor. Each exposure pathway must include the following elements:

- a source and mechanism of chemical release to the environment;

- an environmental transport medium (e.g., air, ground water) for the released chemical;

- a point of potential human contact with the contaminated medium (referred to as the exposure point); and

- receptor contact (e.g., ingestion of contaminated ground water).

Exposure may occur when contaminants migrate from the Site to an exposure point (i.e., a location where receptors can come into contact with contaminants) or when a receptor comes into direct contact with waste or contaminated media at the Site. An exposure pathway is complete (i.e., exposure occurs) if there is a way for the receptor to take in contaminants through ingestion, inhalation, or dermal absorption of contaminated media.

(3) Exposure Point Concentrations and Routes of Exposure

Potential human exposure to the contaminants at the Site was assessed by evaluating chemical sources and receiving media, migration pathways (fate and transport), potential human receptors, exposure points, and exposure routes. The areas identified as potential sources of human exposure were characterized with respect to potential chemical migration and exposure pathways. Four potential exposure pathways were identified. They were:

- Residential exposure to bedrock groundwater as drinking water

The current pumping of groundwater at the Site prevents off-site migration and any current residential exposure. Consequently, there are no receptors under the current pumping conditions. To assess the risk associated with residential use of the bedrock aquifer in the future, a hypothetical scenario was developed which assumed that the groundwater plumes as currently exist onsite migrated unchanged to a residential well.

Although two aquifers are present under the Site, residential exposure with respect to drinking water is to the bedrock groundwater only since the overburden discharges directly into the river.

- Swimmer exposure to Schuylkill River surface water

The swimmer exposure scenario considered discharge to the river from both the bedrock and overburden aquifers, and from surface water runoff from the Site.

- Worker exposure to on-site soils or sediments

The Site is fenced and a full-time guard is present, therefore the site access is limited to on-site workers, trespassing is unlikely. Access to the Site from the Schuylkill River boundary is also considered unlikely due to thick vegetation and steep river banks along the property boundary. The exposure pathway is assumed to be incidental ingestion since most of the site is either vegetated or paved, which prevents fugitive dust emissions and subsequent dust inhalation. The areas of concern with regard to worker exposure are the soil/sediments contained in the earthen lagoons, soils surrounding the lined lagoons, the borrow area soils/sediments, the drainage swale soil/sediments, the sediments of the storm drain, and the plant area soils. In the plant area where subsurface soils were found to have the highest volatile levels, worker exposure to the subsurface soils were evaluated as if these buried soils were actually surface soils. In reality, the majority of the plant area is asphalted thereby limiting exposure.

. Residential exposure to on-site soils or sediments

Although the Site is currently an industrial facility, a futureresidential exposure scenario was considered in the event that plant ceases operation as a manufacturing facility, and the Site is re-zoned. Residential exposures were limited to the plant area, earthen lagoons and borrow area, though the borrow area is in the floodplain where residential exposure would be extremely limited. The lined lagoons are undergoing closure and therefore, will not present a future residential exposure. The storm drains and the swale area would be inconsistent with future residential development and would likely be relocated in a new stormwater management plan.

(4) Toxicity Assessment Summary

The Baseline Risk Assessment addresses two general types of toxicities which may result from chemical exposure: carcinogenic and noncarcinogenic effects.

Noncarcinogenic effects of chemicals are assumed to display a threshold phenomenon; i.e., effects are not observed below a given chemical concentration (threshold dose). Therefore, a health risk is thought to exist only if established threshold doses are exceeded. Noncarcinogenic health effects include a variety of toxic effects on body systems, such as renal toxicity (toxicity to the kidneys), teratogenicity (damage to the developing fetus), and central nervous system disorders.

Reference doses ("RfDs") have been developed by EPA for indicating the potential for adverse health effects from exposure to contaminant(s) of concern exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimates of intakes of contaminant(s) from environmental media (e.g., the amount of a contaminant(s) of concern ingested from contaminated drinking water, etc.) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Carcinogenic effects are considered to have a dose-response relationship with no threshold. Thus, the BRA considers that any exposure to a carcinogen is associated with some degree of risk. U.S. EPA has developed the scheme for the review of information and the classification of chemicals as to their likelihood of causing cancer. This classification scheme distinguishes between chemicals which are known human carcinogens (Group A) and chemicals which are probable human carcinogens (Group B), based on their cancer-causing properties in animal studies. The dose-response relationship for an established or potential carcinogen is incorporated into the slope factor ("SF"), a value expressed in (mg/kg-day)[-1], which is directly proportional to the cancer potency of the chemical.

SF's have been developed by EPA's Carcinogenic Assessment Group as a means of estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic contaminant(s) of concern. SFs are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. SF's are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

The critical toxicity values (RfDs and Sfs) used in the present risk assessment are shown in Tables 12 through 15. EPA verified toxicity values developed from the dose-response relationships for carcinogens and noncarcinogens are available for use in risk assessment from the EPA Integrated Risk Information System Database (IRIS) or the EPA Health Effects Assessment Summary Tables (HEAST). Toxicity values are most often derived from oral dosage studies in laboratory animals. Under these circumstances, EPA generally evaluated the risk associated with the inhalation exposure route by extrapolation from oral toxicity information (oral RFDs and supporting studies) to predict inhalation toxicity. Oral RFDs and SFs are available from either IRIS or HEAST for use in risk assessment of oral and dermal exposure routes, inhalation reference concentrations (RFCs) are not available for all compounds of potential concern on the Site.

(5) Risk Characterization Summary

A. Human Health Risks

The National Contingency Plan ("NCP") establishes acceptable levels of carcinogenic risk for Superfund sites at between one in ten thousand and one in one million additional cancer cases if no cleanup actions are taken at a site. Expressed in scientific notation, this translates to an acceptable risk range of between 1 x 10[-4] and 1 x 10[-6] over a defined period of exposure to contaminants at a site. This means that one additional person in ten thousand or one additional person in a million, respectively, could develop cancer over a defined period of exposure to contaminants at the Site.

The baseline Risk Assessment calculates risk to humans of contracting other, non-carcinogenic health effects from exposure to substances associated with the Site by dividing the reasonable maximum exposure associated with the Site by doses that are determined by EPA to be without harmful health effects. The ratios are added to represent exposure to multiple contaminants. Any result of this calculation (known as the Hazard Index) which is greater than one (1.0) is considered to present an unacceptable risk.

When reviewing the quantitative information presented in thissection, values greater than 1 x 10[-4] to 1 x 10[-6] for carcinogenic risk, and chronic Hazard Index values greater than 1.0 for non-carcinogenic risk, indicate the potential for adverse health impacts.

1. Noncarcinogenic Risk

The Hazard Index ("HI") Method is used for assessing the overall potential for noncarcinogenic effects posed by the indicator compounds. Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient ("HQ") (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the HI can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

Table 16 presents the calculated Hazard Indices for the potentially exposed populations identified. The table summarizes the risk estimates by type of land use, area, environmental media and routes of exposure.

An HI of 15 for adults and 35 for children were calculated for the ingestion, inhalation, and dermal adsorption of bedrock groundwater by an onsite resident under the future site use scenario. An HI of 1.1 was calculated for the ingestion of earthen lagoon soil/sediments by an on-site resident under the future site use scenario.

2. Carcinogenic Risk

For potential carcinogens, risks are estimated as probabilities. Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency slope and expressing the result in scientific notation. An excess lifetime cancer risk of 1 x 10[-6] indicates that, as aplausible upper bound, an individual has a one in a million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. There are currently no significant cancer risks associated with exposure to any areas of concern at the Site.

Under the future use scenario, an excess cancer risk of 6.2 x 10[3] was calculated for the ingestion, inhalation, and dermal adsorption of bedrock groundwater by a potential on-site resident.

Table 16 summarizes the calculated potential carcinogenic risk to the potentially exposed populations for each area of the Site.

B. Environmental Risks

An Ecological Assessment was performed for the Site. It involved wetlands delineation, plant community delineation, wildlife and habitat surveys, and a receptor evaluation. These involved field investigations and review of published data. However, the ecological risk assessment did not assess the effects on environmental receptors, especially avian receptors, from exposure to contaminants in the sediment basin and drainage swale. The RI reports numerous avian species observed or reported to potentially occur in habitats associated with the basin and swale.

The United States Department of Interior has reviewed this information and has found that the sediments in the drainage swale leading from the sedimentation basin contains high levels of the following contaminants with the noted maximum detected level: PAHs - 99 ppm, dibenzofurans - 1.3 ppm, mercury 3.1 ppm, and PCBs - .74 ppm. Though there are no sediment criteria, the results exceed the median sediment level from bioassessment studies for each contaminant reported in Long and Morgan (1990) as capable of causing adverse biological effects. These compounds (i.e. PAHs, dibenzofurans, mercury, and PCBs) when at high environmental levels are now also implicated with adversely affecting avian embryonic and phenotype development.

C. Significant Sources of Uncertainty

The BRA makes certain assumptions in calculating risk for the Site. However, as is the case with any risk assessment, assumptions are necessary to make the best probable estimate of risk. For example, many sources of uncertainty are inherent in the development of EPA verified toxicity values. The uncertainty results from the extrapolation of high-dose, short-term, animal studies to estimate risk to chronic, low-dose exposure in humans. Current and future exposure scenarios were assumed to be applicable to potentially exposed populations. No allowance was made for antagonistic, potentiative, or
synergistic chemical interactions in calculating the toxicity of chemicals. Each of these assumptions have their own range of uncertainty which must be recognized and weighed in the interpretation of the results.

D. Risk Assessment Conclusions

Current groundwater pumping at the Site is preventing the contaminated groundwater from migrating off the site. Because there is no current use of the groundwater as a drinking water source the focus of the risk assessment regarding the groundwater was to evaluate potential risks associated with future conditions at the Site in the absence of groundwater pumping. The following potential exposure scenarios were identified for this risk assessment: future residential exposure to bedrock groundwater and site soils/sediments (adult and children), future and current worker exposure to site soil and sediments, and future and current swimmer exposure to Schuylkill River surface water.

An unacceptable level of carcinogenic risk is presented by the bedrock groundwater in a future land use scenario involving an on-siteresident's ingestion, inhalation and dermal contact with the ground water contaminants. Actual or threatened releases of hazardous substances from this portion of the Site, if not addressed by implementing the response action selected in this ROD, may present a substantial endangerment to public health, welfare, or the environment.

In addition, the concentrations of the five principal chemicals found in the groundwater during the RI exceed the allowable levels under the Safe Drinking Water Act.

An unacceptable level of non-carcinogenic risk is presented by the earthen lagoon soil/sediments in a future land use scenario involving an on-site child's ingestion of soil/sediment contaminants. Actual or threatened releases of hazardous substances from this portion of the Site, if not addressed by implementing the response action selected in this ROD, may present a substantial endangerment to public health, welfare, or the environment.

An unacceptable level of risk is presented by the Sediment Pond and Drainage Swale sediments involving the avian species' ingestion of contaminated sediments. Actual or threatened releases of hazardous substances from this portion of the Site, if not addressed by implementing the response action selected in this ROD, may present a substantial endangerment to the environment.

## VII. SUMMARY OF REMEDIAL ALTERNATIVES

In accordance with Section 300.430 of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. 300.430, a list of remedial response actions and representative technologies were identified and screened to determine whether they would meet the remedial action objectives at the Site. Those that would meet the remedial action objectives are discussed below as Remedial Alternatives.

Section 121(d) of CERCLA requires that remedial actions at CERCLA Sites at least attain legally applicable or relevant and appropriate federal and State standards, requirements, criteria and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4). Applicable requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under federal or State law that specifically address hazardous substances found at the Site, the remedial action to be implemented at the Site, the location of the Site or other circumstances present at the Site. Relevant and appropriate requirements are those substantive environmental protection requirements, criteria or limitations promulgated under federal or State law which, while not applicable to the hazardous materials found at the Site, the remedial action itself, the Site location or other circumstances at the Site, nevertheless address problems or situation sufficiently similar to those encountered at the Site that their use is well-suited to the Site. ARARs may relate to the substances addressed by the remedial action (chemical-specific), to the location of the Site (location-specific), or to the manner in which the remedial action is implemented (action-specific).

It should be noted that all costs, time frames and waste/treatment volumes indicated below are estimates based on the RI/FS and the Administrative Record for this Site. This information will be further refined for the selected remedial alternatives during the remedial design.

## SUMMARY OF REMEDIAL ALTERNATIVES FOR THE OCCIDENTAL CHEMICAL SITE

### GROUNDWATER

#### Alternative 1A - No Action/Institutional Controls

Alternative 1B - Groundwater Collection Using Production Wells and Treatment by Air Stripping

Alternative 2A - Groundwater Collection Using Recovery Wells andTreatment by Air Stripping After the Process

Alternative 2B - Groundwater Collection Using Recovery Wells and Treatment by Air Stripping Before the Process

Alternative 3A - Groundwater Collection Using Recovery Wells and Treatment by Steam Stripping Before the Process

Alternative 3B - Groundwater Collection Using Recovery Wells and Treatment by Steam Stripping After the Process

EARTHEN LAGOONS

Alternative 1 - No Action with Deed/Land Use Restriction

Alternative 2 - On-Site Drying of PVC Layers and Landfilling of Coal Fine Layer

Alternative 3 - Off-Site Drying of PVC Layers and Landfilling of Coal Fine Layer

Alternative 4 - Landfilling of the Lagoon Materials

A. Remedial Alternatives for Bedrock Groundwater

1. Alternative 1A - No Action/Institutional Controls

Major Components of the Remedial Action

The NCP requires that EPA consider a "No Action" alternative for every site to establish a baseline for comparison to alternatives that do require action. Under this alternative, plant production wells would be shut down and no groundwater would be collected and treated. Deed/Land Use Restrictions would be placed on the property to prevent use of groundwater. This alternative would require OCC to collect its process water from the Schuylkill River which would allow the contaminated groundwater to migrate off-site to residential wells and the Schuylkill River.

Estimated Capital Costs: $0
Estimated Annual O&M Costs: $0
Estimated Present-Worth Costs: $ 600
Estimated Implementation Time: Immediate

Compliance with ARARs

There are no ARARs associated with a No Action Alternative.

2. Alternative 1B - Groundwater Collection Using Existing Production Wells and Treatment by Air Stripping

Major Components of the Remedial Action

This alternative allows the present pumping scenario to continue without alteration. It is in place at the Site and would not be modified. Contaminated ground water is contained by using the existing collection and treatment system at the plant to provide process water from the existing production wells. The process water is used for product washing and as a cooling water. Additional chemicals from the process are introduced into the process water and pretreatment is required before discharge. The groundwater is treated in the existing air stripper to reduce TCE and vinyl chloride monomer before discharge to the Pottstown POTW. The vent gases leave the air stripping column and are discharged directly to the atmosphere.

Estimated Capital Costs: $000
Estimated Annual O&M Costs: $8,380
Estimated Present-Worth Costs: $ 69,000
Estimated Implementation Time: 100 Years

Compliance with ARARs

Contamination in the ground water is required to be reduced to background levels by 25 PA Code 264.90 - 264.100, specifically 25 PA Code 264.90(i) and (j) and 264.100(a)(9). PADER's February, 1992, policy document, "Ground water Quality Protection Strategy," is to be considered in the implementation of this remedy but is not a ARAR. This policy document defines the framework for ground water remediation programs in Pennsylvania. In it, Pennsylvania Department of Environmental Resources (PADER) states that its goal is "nondegradation of ground water quality" (p.1), which has been interpreted to mean that the ultimate goal of all remediation projects is to restore levels tobackground quality.

However, PADER recognizes that "there are technical and economic limitations to immediately achieving the goal of nondegradation for all ground waters" (pp. 1-2), and that levels above background may not present unacceptable risk to human health and the environment. If EPA and PADER determine that it is not technically practicable based on performance monitoring to achieve the background concentration for any contaminant throughout the entire area of the ground water contamination, then the Safe Drinking Water Act (42 U.S.C. 300f-300j-26) MCL for that contaminant shall be the level of contamination which this alternative shall achieve.

The existing system in place does not comply with the ARARs described above. The system is designed to contain the contaminant plumes and provide process water for plant production. It is not designed to restore groundwater to background levels as required by 25 PA Code 264.90 - 264.100

Action-specific ARARs apply to the discharge of treated ground water. The effluent is discharged to the Publicly Owned Treatment Works (POTW), therefore the pretreatment regulations are applicable under this alternative. Any surface water discharge would comply with the substantive requirements of the Clean Water Act National Pollution Discharge Elimination System (NPDES) discharge regulations (40 C.F.R. 122.41 - 122.50 and 40

C.F.R. 131), the Pennsylvania NPDES Regulations (25 PA Code 91 and 92.31), the Pennsylvania Water Treatment Regulations (25 PA Code 95.1 - 95.3 and 97) and the Pennsylvania Water Quality Standards (25 PA Code 93.1 - 93.9). As discussed above, this alternative is a description of the existing pump and treat system. The current air stripper discharges the vent stream to the air without emission controls. Therefore, it does not comply with the ARARs described below.

Action-specific ARARs would also apply to the VOC emissions fromany air stripping tower. VOC emissions from an air stripping tower would be governed by the PADER air pollution regulations. Air Emissions would also comply with 40 C.F.R. Part 264, Subpart AA, and 25 PA Code Chapter 264, Subchapter AA (Standards for Process Vents), and with 40 C.F.R. Part 264, Subpart BB, and 25 PA Code Chapter 264, Subchapter BB (Air Emissions Standards for Equipment Leaks). Air emissions of Vinyl Chloride would comply with 40 C.F.R. Part 61, National Emission Standards for Hazardous Air Pollutants (NESHAPS).

Air permitting and emissions ARARs are outlined in 25 PA Code Chapters 123, 127, 131, 135 and 139. 25 PA Code 127.12 requires all new air emission sources to achieve minimum attainable emissions using the best available control technology (BAT). In addition, the PADER air permitting guidelines for remediation projects require all air stripping and vapor extraction units to include emission control equipment.

OSWER Directive 9355.0-28 - Control of Air Emissions from Superfund Air Strippers at Superfund Ground water Sites although not an actionspecific ARAR, is to be considered for any air stripper used in this remedy.

3. Alternative 2A - Groundwater Collection Using Recovery Wells and Treatment by Air Stripping (with Vapor Phase Carbon Adsorption) Before the Process

Major Components of the Remedial Action

This groundwater pumping and treatment alternative is designed to optimize well locations and recovery rates. It prevents migration of the five contaminant plumes and removes the contaminants from the saturated zone. Groundwater would be extracted by controlled pumping to prevent mixing of the plumes. Occidental used a model to estimate that ground water would be extracted at a pumping rate of approximately 335 gallons per minute and treated above ground by Air Stripping. However, exact pumping rates and configurations will be determined during remedial design subject to approval by EPA in consultation with PADER and the Delaware River Basin Commission (DRBC). Air stripping would remove the volatile organics (TCE, trans-1,2,DCE, VCM, styrene, ethylbenzene) from the groundwater and the vapor-phase carbon adsorption unit would remove the volatiles from the air stream. The carbon unit when "saturated" by the contaminants shall be regenerated on-site. In carbon regeneration, the carbon is heated in a kiln-like apparatus to "release" the contaminants from the carbon, the "regenerated" carbon is then available for re-use. The majority of the contaminants that adsorb onto the carbon are destroyed in the regeneration. However, any residual contaminants trapped in the kiln pollution control device must be further treated/disposed and shall be handled as a RCRA hazardous waste.

The treated groundwater would be used in Occidental's current PVC production process. Once the volatile organics are removed by the air stripper, the ground water would undergo additional treatment before discharge either to the Pottstown Publicly Owned Treatment Works (POTW) or the Schuylkill River.

Estimated Capital Costs: $1,400,000
Estimated Annual O&M Costs: $ 340,000
Estimated Present-Worth Costs: $ 7,100,000
Estimated Implementation Time: 100 Years

Compliance with ARARs

Contamination in the ground water is required to be reduced to background levels by 25 PA Code 264.90 - 264.100, specifically 25 PA Code 264.90(i) and (j) and 264.100(a)(9). PADER's February, 1992, policy document, "Ground water Quality Protection Strategy," although not an ARAR, would be considered in the implementation of this remedy. This policy document defines the framework for ground water remediation programs in Pennsylvania. In it, Pennsylvania Department of Environmental Resources (PADER) states that its goal is "nondegradation of ground water quality" (p.1), which has beeninterpreted to mean that the ultimate goal of all remediation projects is to restore levels to background quality.

However, PADER recognizes that "there are technical and economic limitations to immediately achieving the goal of nondegradation for all ground waters" (pp. 1-2), and that levels above background may not present unacceptable risk to human health and the environment. If EPA and PADER determine that it is not technically practicable based on performance monitoring to achieve the background concentration for any contaminant throughout the entire area of the ground water contamination, then the Safe Drinking Water Act (42 U.S.C 300f-300j-26) the less restrictive MCL for that contaminant shall be the level of contamination which this alternative shall achieve.

Action-specific ARARs would apply to the discharge of treated ground water. Depending on the method of effluent discharge from the ground water treatment system, applicable NPDES or Publicly Owned Treatment Works ("POTW") pretreatment regulations would apply. Any surface water discharge would comply with the substantive requirements of the Clean Water Act NPDES discharge regulations (40 C.F.R. 122.41 - 122.50 and 40 C.F.R. 131), the Pennsylvania NPDES Regulations (25 PA Code 91 and 92.31), the Pennsylvania Water Treatment Regulations (25 PA Code 95.1 - 95.3 and 97) and the Pennsylvania Water Quality Standards (25 PA Code 93.1 - 93.9).

Action-specific ARARs would apply to the treatment of a hazardous waste. The ground water collection and treatment operations will constitute treatment of hazardous waste. The ground water contains listed hazardous wastes. Treatment may result in the generation of contaminated treatment residuals. The remedy to be implemented will comply with the applicable requirements of 25 PA Code Part 262 Subparts A (relating to hazardous waste determination and identification numbers), B (relating to manifesting requirements for Off-siteshipments of spent carbon or other hazardous wastes), C (relating to transporters of hazardous waste), and with respect to operations at the site generally, with the substantive requirements of 25

PA Code 264 Subparts B-D, I (in the event that hazardous waste generated as part of the remedy is managed in containers), J (in the event that hazardous waste is managed, treated or stored in tanks).

The Site ground water is above the TCE level (500 ppb) that qualifies for handling groundwater as a hazardous waste as specified in 25 PA Code Chapter 261 Subchapter C and 40 C.F.R. 261.24.

Action-specific ARARs would also apply to the VOC emissions from any air stripping tower. VOC emissions from an air stripping tower would be governed by the PADER air pollution regulations. Air Emissions would also comply with 40 C.F.R. Part 264, Subpart AA, and 25 PA Code Chapter 264, Subchapter AA (Standards for Process Vents), and with 40 C.F.R. Part 264, Subpart BB, and 25 PA Code Chapter 264, Subchapter BB (Air Emissions Standards for Equipment Leaks). Air emissions of Vinyl Chloride would comply with 40 C.F.R. Part 61, National Emission Standards for Hazardous Air Pollutants (NESHAPS).

Air permitting and emissions ARARs are outlined in 25 PA Code Chapters 123, 127, 131, 135 and 139. 25 PA Code 127.12 requires all new air emission sources to achieve minimum attainable emissions using the best available control technology (BAT). In addition, the PADER air permitting guidelines for remediation projects require all air stripping and vapor extraction units to include emission control equipment.

OSWER Directive 9355.0-28 - Control of Air Emissions from Superfund Air Strippers at Superfund Ground water Sites although not an actionspecific ARAR, is to be considered for any air stripper used in this remedy.

The on-site carbon regeneration is subject to the substantive requirements of a Hazardous Waste Permit in Pennsylvania (23 PB 422) under 25 PA Code 265.431.

Fugitive dust emissions generated during remedial activities would be controlled in order to comply with fugitive dust regulations in the federallyapproved State Implementation Plan for the Commonwealth of Pennsylvania, 40 C.F.R. Part 52, Subpart NN, 52.2020 - 52.2023, and 25 PA Code 123.2, and the National Ambient Air Quality Standards for particulate matter in 40 C.F.R. 50.6 and 25 PA Code 131.2 and 131.3.

This Alternative will comply with 25 PA Code Chapter 264, Subchapter F, 264.97, regarding ground water monitoring.

This Alternative will comply with regulations concerning well drilling as set forth in 25 PA Code Chapter 107. These regulations are established pursuant to the Water Well Drillers License Act, 32 P.S. 645.1 et seq.

This Alternative would comply with the Delaware River Basin Commission Ground Water Protected Area Regulations regarding construction of water extraction wells (No. (6) (f); Water Code of the Basin, Section 2.50.2), metering of surface water intakes (No. 9; Water Code of the Basin, Section 2.50.2), non-interference with domestic or other existing wells (No. 10) and non-impact on ground water levels, ground water storage capacity, or low flows of perennial streams (No. 4; Water Code of the Basin, Section 2.20.4).

The substantive requirements of the Delaware River Basin Commission (18 C.F.R. Part 430) are applicable. These regulations establish requirements for the extraction of groundwater within the Delaware River Basin.

4. Alternative 2B - Groundwater Collection Using Recovery Wells and Treatment by Air Stripping (with Vapor-Phase Carbon Adsorption) After the Process

Major Components of the Remedial Action

This alternative is identical to that described in Alternative 2A with the exception that Occidental's estimate of ground water pumping to be at a rate of approximately 620 gallons per minute (gpm) to an Air Stripper located after the PVC Production Process. The 620 gpm is a combination flow from the remediation recovery wells and additional production wells which would be providing water to Occidental's process operations. However, exact pumping rates and configurations would be determined during remedial design subject to approval by EPA in consultation with PADER and the DRBC. The air stripper unit for this alternative is designed to handle a larger flow than alternative 2A. Once the volatile organics are removed by the air stripper, the ground water would undergo additional treatment before discharge either to the Pottstown POTW or the Schuylkill River.

Estimated Capital Costs: $ 1,600,000
Estimated Annual O&M Costs: $ 430,000
Estimated Present-Worth Costs: $ 8,700,000
Estimated Implementation Time: 100 Years

Compliance with ARARs

The ARARs discussed above under Alternative 2A will be complied with under Alternative 2B.

5. Alternative 3A - Groundwater Collection Using Recovery Wells and Treatment by Steam Stripping Before the Process

Major Components of the Remedial Action

This groundwater pumping and treatment alternative is similar to Alternative 2A with the exception that the volatile organics would be removed using Steam Stripping. As described in Alternative 2A, this option also optimizes well locations and recovery rates. It prevents migration of the five contaminant plumes and removes the contaminants from the saturated zone. Groundwater would be extracted by controlled pumping to prevent mixing of the individual contaminant plumes. The groundwater would be extracted at a pumping rate of approximately 335 gallons per minute and treated above ground by Steam Stripping. However, exact pumping rates and configurations will be determined during remedial design subject to approval by EPA in consultation with PADER and the Delaware River Basin Commission (DRBC). Steam Stripping would remove the volatile organics from the groundwater. The volatile organics that are removed during steam stripping would enter a condenser which would require off-site disposal. The Steam Stripper would be located before any production process, including Occidental's current PVC production process.  Once the volatile organics are removed, the ground water would undergo additional treatment before discharge to either the Pottstown POTW or the Schuylkill River. Schuylkill River.

Estimated Capital Costs:  $ 1,400,000
Estimated Annual O&M Costs:  $ 560,000
Estimated Present-Worth Costs:  $ 11,000,000
Estimated Implementation Time:  100 Years

Compliance with ARARs

The ARARs discussed above under Alternative 2A will be complied with under Alternative 3A.

6.  Alternative 3B - Groundwater Collection Using Recovery Wells and Treatment by Steam Stripping After the Process

Major Components of the Remedial Action

This alternative is identical to that described in Alternative 3A with the exception that the groundwater would be pumped at a rate of approximately 620 gpm to the Steam Stripper which is located after the PVC Production Process. However, exact pumping rates and configurations will be determined during remedial design subject to approval by EPA in consultation with PADER and the DRBC.  Steam Stripping would remove the volatile organics from the groundwater. The volatile organics that are removed during steam stripping would enter a condenser which would require off-site disposal.  Once the volatile organics are removed, the groundwater would undergo additional treatment beforedischarge either to the Pottstown POTW or the Schuylkill River.

Estimated Capital Costs:  $ 1,800,000
Estimated Annual O&M Costs:  $ 715,000
Estimated Present-Worth Costs:  $ 13,470,000
Estimated Implementation Time:  100 Years

Compliance with ARARs

The ARARs discussed above under Alternative 3A would also apply to Alternative 3B.

B.  Remedial Alternatives for the Earthen Lagoons

1.  Alternative 1 - No Action/Institutional Controls

Major Components of the Remedial Action

The NCP requires that EPA consider a "No Action" alternative for every site to establish a baseline for comparison to alternatives that do require action. Under this alternative the lagoons would be left in place and deed restrictions would be placed on the area to prevent use of the soils.

Estimated Capital Costs:  $0
Estimated Annual O&M Costs:  $0

Estimated Present-Worth Costs:  $ 600
Estimated Implementation Time:  Immediate

Compliance with ARARs

There are no ARARs associated with a No Action Alternative.

2.  Alternative 2 - On-Site Drying of PVC Layers and Landfilling of the Coal Fines Layer

Major Components of the Remedial Action

This alternative provides for on-site drying of the white and gray PVC layers of the earthen lagoons and landfilling of the coal fines layer.  This alternative requires that an access road be constructed to the lagoons.  The layers will be dried in an on-site dryer and the vapors from the dryer will be treated to reduce VOC emissions prior to discharge.  Appropriate portions, of the PVC layers of reclaimed material will be marketed as reclaimed product,and the coal fines layer, contaminated soil, or residuals will be transported off-site to an appropriate disposal facility.

This alternative includes a post-excavation sampling program to document complete removal of the chemicals of concern outlined in Table 3 to background concentrations.

Estimated Capital Costs:  $3,847,000
Estimated Annual O & M Costs:  $63,000
Estimated Present Worth Costs:  $4,019,000
Estimated Implementation Time:  3 Years

Compliance with ARARs

This alternative would comply with the following ARARs:

Pennsylvania Clean Streams Law establishes an enforceable law intended to reclaim and restore polluted streams through water quality control. Flooding of the earthen lagoons may be considered discharge of industrial materials into a receiving water body under this law.

On-site treatment (recycling), storage will comply with RCRA regulations 40 C.F.R. Part 264 and standards for owners and operators of hazardous waste treatment, storage and disposal facilities.  It will also comply with 25 PA Code Chapter 264.

Determinations about the effectiveness of any soil remediation at the Site shall be compared with EPA document no. 230/02-89-042, Methods for Evaluating Cleanup Standards, Vol. I:  Soils and Solid Media, although not an ARAR for the Site, this document shall be considered.

Regulations of activities affecting waters of the U.S. require that activities being conducted on waters of the United States, including wetlands, should first avoid impacts to Waters of the U.S., and then minimize impacts. All unavoidable impacts to such areas will require restoration and mitigation to compensate for all function and values lost by implementing the remedial action, including the time for the mitigation to become fully effective.

Pennsylvania Air Pollution Control Regulations PA Code Title 25, Chapter 212 through 293 govern air emissions from remedial actions and provide for the control of air pollutants and guidance for the design and operations of air pollution sources. Air emissions may occur during excavation and drying of earthen lagoon materials.

Pennsylvania Erosion Control Regulations PA Code Title 25, Chapter 102 apply to excavation and activities to control erosion.

Pennsylvania Stormwater Management Act of October 4, 1978 regulates migration of stormwater from industrial sites either as point or non-point sources, which may be applicable during excavation of the earthen lagoons.

3. Alternative 3 - Off-Site Drying of PVC Layers and Landfilling of Coal Fines Layer

Major Components of the Remedial Action

This alternative provides for off-site drying of the white and gray PVC layers and the landfilling of the coal fines layer. The alternative requires building an access road to the lagoons, excavating each of the layers of material, transporting the PVC layers to an off-site dryer, where it is dried, bagged, packaged and transported back to OCC for marketing as reclaimed product. The coal fines layer and any contaminated soil will be transported to an appropriate off-site disposal facility.

This alternative includes a post-excavation sampling program to document complete removal of the chemicals of concern outlined in Table 3 to background concentrations.

Estimated Capital Costs: $5,900,000
Estimated Annual O & M Costs: $8,640
Estimated Present Worth Costs: $5,915,000
Estimated Implementation Time: 2 Years

Compliance with ARARs
The ARARs discussed above under Alternative 2 would also be complied with under Alternative 3.

4. Alternative 4 - Landfilling of the Lagoon Materials

Major Components of the Remedial Action

This alternative provides for landfilling of all material in the earthen lagoons. This alternative requires that an access road be built to the earthen lagoons area, and that all of the material is excavated from the lagoons and is transported for disposal off-site at an appropriate landfill. This estimate is based on disposal in a non-hazardous landfill. However, disposal in a hazardous landfill would still be a possibility.

This alternative includes a post-excavation sampling program to document complete removal of the chemicals of concern outlined in Table 3 to background concentrations.

Estimated Capital Costs: $5,389,832
Estimated Annual O & M Costs: $2,880
Estimated Present Worth Costs: $5,394,000
Estimated Implementation Time: 2 Years

Compliance with ARARs

The ARARs discussed above under Alternative 2 would also be complied with under Alternative 4.

VIII. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

The remedial action Alternatives described above for each area of the Site were evaluated under the nine evaluation criteria set forth in the NCP at 40 C.F.R. 300.430(e)(9). These nine criteria are organized according to the following categories listed in 40 C.F.R. 300.430(f)(1):

Threshold Criteria

- Overall protection of human health and the environment
- Compliance with applicable or relevant and appropriate requirements (ARARs)

Primary Balancing Criteria

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost

Modifying Criteria

- Community acceptance
- State acceptance

Threshold criteria must be satisfied in order for an Alternative to be eligible for selection. Primary balancing criteria are used to weigh the strengths and weaknesses of the Alternatives and to identify the Alternative which provides the best balance of the criteria. State and community acceptance are modifying criteria which are taken into account after public comment is received on the Proposed Plan. Descriptions of the individual criteria follow:

Overall Protection of Human Health and the Environment. Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, though treatment, engineering controls and/or institutional controls.

Compliance with Applicable or Relevant and Appropriate Requirements. Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes for any hazardous substances left on-site or whether it provides a basis for invoking a waiver.

Long-Term Effectiveness and Permanence. Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain its effectiveness over time. It includes the consideration of residual risk and the adequacy and reliability of controls.

Reduction of Toxicity, Mobility, and Volume. Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies a remedy may employ.

Short-Term Effectiveness. Short-term effectiveness refers to the period of time needed to complete the remedy and any adverse impacts on human health and the environment that may be posed during the construction and implementation of the remedy until cleanup levels are achieved.

Implementability. Implementability refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement that remedy.

Cost. Cost includes estimated capital, operation and maintenance, and net present worth costs.

Community Acceptance. Community acceptance addresses whether or not the public agrees with the Preferred Remedial Alternative. This is assessed in the Record of Decision following a review of the public comments received on the Administrative Record and the Proposed Plan.

State Acceptance. State acceptance addresses whether the State concurs with, opposes, or has no comment on the Preferred Remedial Alternative.

A. COMPARATIVE ANALYSIS OF ALTERNATIVES - GROUNDWATER

Overall Protection: Since Alternative 1A (No Action) would neither eliminate nor reduce to acceptable levels the threats to human health or the environment presented by contamination at the Site, it is unacceptable and therefore, it will not be discussed in the remainder of this analysis.

Alternative 1B - (Production Wells & Treatment by Air Stripping with Carbon Adsorption) prevents direct contact with the contaminated ground water by collecting groundwater and treating volatile organics and it prevents groundwater impact on surface water. However, it does not optimize collection of chemicals from the bedrock aquifer because the pumping system was designed to provide process water, not remediate the groundwater. It also does not minimize the discharge of volatile organics to the air because the air stripper is designed to operate without VOC controls. Therefore, this alternative is not considered protective of human health and the environment and will not be discussed in the remainder of this analysis.

Alternative 2A (Recovery Wells & Treatment by Air Stripping (with Carbon Absorption) Before Process) - adequately protects human health and the environment by collecting groundwater and treating it to background concentrations and eliminates air discharges of VOCs. It protects the environment because it minimizes waste streams to be disposed during remediation and prevents contaminated groundwater from migrating off-site.

Alternative 2B (Recovery Wells with Air Stripper After Process) adequately protects human health and the environment by collecting groundwater and treating volatile organics to background concentrations and eliminates air discharges of VOCs. It protects the environment because it minimizes waste streams to be disposed during remediation and prevents contaminated groundwater from migrating off-site.

Alternative 3A (Recovery Wells with Steam Stripper Before Process) - adequately protects human health and the environment by collecting groundwater and treating volatile organics to background concentrations and eliminates air discharges of VOCs. It protects the environment because it minimizes waste streams to be disposed during remediation and prevents contaminated groundwater from migrating off-site.

Alternative 3B (Recovery Wells with Steam Stripper After Process) adequately protects human health and the environment by collecting groundwater and treating volatile organics to background concentrations and eliminates air discharges of VOCs. It protects the environment because it minimizes waste streams to be disposed during remediation and prevents contaminated groundwater from migrating off-site.

Compliance with ARARs: Levels of volatile organics in the groundwater are in excess of Safe Drinking Water Act Maximum Contaminant Levels (MCLs). The goal of the groundwater remedy for the Site is to restore the quality of groundwater to comply with Pennsylvania ARARs of background quality. EPA believes that Alternatives 2A through 3B can meet the Pennsylvania ARARs as well as all other ARARs associated with Alternatives 2A through 3B.

Long Term Effectiveness and Permanence: Alternatives 2A through 3B would likely reduce risk to acceptable levels under the future use scenario. Alternatives 2A through 3B are effective in the long-term because of the conservative design of the treatment system, which can handle fluctuations of concentrations of chemicals in groundwater and dynamic discharge regulations. Groundwater monitoring is to be conducted to document the progress of remediation. Table 17 displays the results of groundwater modeling performed at the OCC Site. It shows that the five volatile plumes will be significantly reduced within the first 25 years. It predicts that after 50 years of pump and treat the only detectable chemical remaining is TCE. At the end of remediation, the concentration of TCE remaining in the groundwater is expected to be below MCLs.

However, Occidental developed Alternatives 2A and 3A to take place before the production process while Alternatives 2B and 3B take place after the process. The production process at the Site is irrelevant to the selected remedy. The remedial action at the Site should be implemented irrespective of whether Occidental's current process, continues, is modified, or ceases. Therefore, EPA prefers Alternative 2A and 3A over 2B and 3B because they are independent of the production process.

Reduction of Toxicity, Mobility, or Volume through Treatment: Alternatives 2A and 2B also reduce the VOCs in the groundwater at the OCC Site. However, Alternatives 2A and 2B provide an efficient remediation program that does not cause cross-migration of the individual chemical plumes or vertical migration of the plumes. Once the groundwater is processed through the air stripper, the VOCs are removed and sent to a vapor-phase carbon unit for absorption of volatile organics. The volatile organics adsorb onto the carbon bed. An on-site carbon regeneration system employs activated carbon to destroy the majority of the volatile organics.

Alternatives 3A and 3B also reduce the VOCs in the groundwater at the OCC Site. Alternatives 3A and 3B provide an efficient remediation program that does not cause cross-migration of the individual chemical plumes. Once the groundwater is processed through the steam stripper and the VOCs are removed from the groundwater, the steam and organic vapors enter a condenser which separates out the organics for off-site disposal. Although off-site disposal is required for the organics there is a reduction in the volume of the organics.

Short Term Effectiveness: The risk associated with the current groundwater use scenario was not calculated during the Feasibility Study since there is no migration of the contamination or current use of the contaminated groundwater.

Drinking water wells in the area are not affected by the groundwater contamination from the OCC Site. Remedial construction workers would be exposed to volatile emissions during any well and pipe installation activities associated with OCC Alternatives 2A through 3B.
Implementability: Alternatives 2A through 3B are proven technologies that have been implemented in numerous CERCLA RODs.

Costs: Of the Alternatives containing remedial action, OCC Alternative 2A - Groundwater Collection Using Recovery Wells and Treatment by Air Stripping Before the Process, the preferred alternative, has the lowest net present worth and complies with the ARARs.

Community Acceptance: The April 1993 Proposed Plan and the May 4, 1993 public meeting produced comments from the general public, local officials, and potentially responsible parties (PRPs) for the Site. Responses to these comments appear in the Responsiveness Summary section of this ROD.

State Acceptance: The Commonwealth of Pennsylvania has concurred with the selection of Alternative 2A as the remedy for this portion of the Site.

B. COMPARATIVE ANALYSIS FOR EARTHEN LAGOONS

Overall Protection: Alternative 1 - No Action would not eliminate or reduce the threats to human health and the environment presented by the contamination at the earthen lagoons. It is not protective of human health and the environment and therefore, will not be discussed in the remainder of this analysis. Alternative 2 and 3 is considered to be more protective than Alternative 4 because recycling of the majority of the lagoon materials occurs under these alternatives.

Compliance with ARARs: Alternatives 2, 3, and 4 will comply with applicable or both relevant and appropriate Federal and State environmental regulations.

Long Term Effectiveness and Permanence: Alternatives 2, 3, and 4 provide long term effectiveness and permanence. Additional long term effectiveness and permanence is provided by Alternatives 2 and 3 as compared with Alternative 4 because Alternatives 2 and 3 minimize the amount of material that is landfilled. Reduction of Toxicity, Mobility or Volume through Treatment: Alternatives 2 and 3 reduce mobility and volume by recycling the majority of lagoon materials. Alternative 4 reduces mobility of the lagoon materials by placement into a secure landfill but does not reduce volume.

Short Term Effectiveness: Alternative 4 provides more short term effectiveness than Alternatives 2 and 3 because it is proposed to take less time than either alternative. Alternatives 3 and 4 require less time for design and installation of remediation equipment than Alternative 2. Worker health and safety will be protected under all alternatives by use of engineering controls and, if necessary, personal protective equipment.

Implementability: Each of the alternatives is implementable. Alternative 2 is anticipated to be more complicated to implement because equipment has to be designed and installed for operation. Alternatives 3 and 4 require material loading, transport off-site, and backfilling activities. Disposal and reclamation activities occur off-site with Alternatives 3 and 4.

Costs: The lowest cost is associated with Alternative 2, followed by Alternative 4. Alternative 3 is the most costly. However, costs estimated for Alternative 4 were based on disposal as a non-hazardous waste. Additional sampling would be required to evaluate appropriate disposal options.

Community Acceptance: The April 1993 Proposed Plan and the May 4, 1993 public meeting produced comments from the general public, local officials, and potentially responsible parties (PRPs) for the Site. Responses to these comments appear in the Responsiveness Summary section of this ROD.

State Acceptance: The Commonwealth of Pennsylvania has concurred with the selection of Alternative 2 as the remedy for this portion of the Site.

## IX. THE SELECTED REMEDY AND PERFORMANCE STANDARDS

### A. General Description of the Selected Groundwater Remedy

Following review and consideration of the information in the Administrative Record file, the requirements of CERCLA and the NCP, and public comment, EPA has selected Alternative 2A (Groundwater Collection Using Recovery Wells and

Treatment by Air Stripping (with Vapor Phase Carbon Adsorption) Before the Process) for the treatment of the bedrock groundwater. Alternative 2A meets the threshold criteria of overall protection of human health and the environment and compliance with ARARs, and provides the best balance of long term effectiveness, reductions of toxicity, mobility and volume of contaminants through treatment, short term effectiveness, implementability and cost.

The selected remedy consists of the following components:

- Installation, operation and maintenance of groundwater extraction wells to remove contaminated groundwater from beneath the Site and to prevent contaminants from migrating further;

- Installation, operation, and maintenance of air stripper to treat groundwater to the required levels;

- Installation, operation, and maintenance of vapor phase carbon unit on air stripper;

- Periodic sampling of groundwater and treated water to ensure that treatment components are effective and that groundwater remediation is progressing towards the cleanup goals; and

- Each component of the selected remedy and its performance standard(s) is described in detail in Section C, below.

PERFORMANCE STANDARDS

(1) Groundwater Extraction and Treatment System

(a) Ground Water Extraction System

Contaminated ground water shall be extracted using multiple wells, the exact location, pumping rate, and number of which shall be determined during the remedial design, and shall be approved by EPA in consultation with PADER and DRBC. The system shall be designed to capture contaminated groundwater throughout the plume. The plume is defined as the ground water which contains contaminants of concern above their background concentrations. (See Table 19) The effectiveness of the system to capture contaminated ground water shall be carefully monitored, and modifications that may be required during its operation may include, but are not limited to, any or all of the following:

- alternating pumping at wells to eliminate stagnation points, i.e., those areas between extraction wells where the ground water may not be captured effectively;

- pulse pumping to allow equilibration of the ground water system and to encourage adsorbed contaminants to partition into ground water; and

- installation of additional extraction wells as necessary to capture the contaminated ground water and/or to facilitate or accelerate the removal of contaminants from the ground water.

(b) Groundwater Cleanup Levels

The well system for extracting groundwater shall be operated until the Performance Standard for each contaminant of concern is met and maintained throughout the entire plume of contamination for a period of 12 consecutive quarters. The plume is defined as the ground water which contains contaminants of concern above their background concentrations. (See Table 18) The Performance Standard for each contaminant of concern in the groundwater shall be the MCL for that contaminant (the federal ARAR for public drinking water supplies under the Safe Drinking Water Act) or the background concentration of that contaminant (the Pennsylvania ARAR under 25 Pa. Code 264.90264.100), whichever is lower. The background concentration for eachcontaminant of concern shall be determined by EPA is consultation with PADER during the Remedial Design in accordance with the procedures for groundwater monitoring outlined in 25 Pa. Code 264.97. Determination of background concentrations shall not delay implementation of the remedy. In the event that a contaminant of concern is not detected in samples taken for the determination of background concentrations, the method detection limits of drinking water analytical methods with respect to that contaminant of concern shall constitute the "background" concentration of the contaminant.

The MCLs for all of the contaminants of concern are set forth at 40 C.F.R. 141.61 (July 1, 1992 ed. including amendments set forth therein). The MCLs, the detection limits and the appropriate analytical methods for testing for the contaminants of concern are listed in Table 18.

(c) Air Stripper and Vapor Phase Carbon Units

The recovered groundwater shall be treated using packed or tray column air stripping units and vapor phase carbon units. The Performance Standard for the air emissions from the air stripping units shall be the requirements of the RCRA regulations set forth at 40 C.F.R. Part 264, Subpart AA - Air Emission Standards for Process Vents.

The total organic emissions from all affected process vents at the Site shall be below 1.4 kg/hr (3 lbs/hr) and 2800 kg/yr (3.1 tons/yr) under this regulation. Any vinyl chloride air emissions from the groundwater treatment units will comply with Section 112 of the Clean Air Act, 42 U.S.C. 7412, National Emission Standard For Hazardous Air Pollutants (NESHAPs). The relevant and appropriate NESHAP for vinyl chloride is set forth at 40 C.F.R. Part 61, Subpart F. The air emissions will also comply with the Commonwealth of Pennsylvania regulations set forth at 25 Pa. Code, Chapter 127, Subchapter A. Those regulations require that emissions be reduced to the minimum obtainable levels through theuse of best available technology, as defined in 25 Pa. Code 121.1.

The on-site regeneration is subject to the substantive requirements of a Hazardous Waste Permit in Pennsylvania under 25 PA Code 265.431.

(d) Discharge of Treated Water

Two discharge options are considered implementable, they are POTW discharge or surface water discharge.

POTW Discharge:

If the treated well water is utilized in the production process, any volatile materials introduced into the remediated well water as it passes through the productions process shall require pretreatment to meet the indirect discharge limits of the POTW.

Surface Water Discharge:

As an alternative, the effluent may be directly discharged to the Schuylkill River. The treated effluent discharged to the Schuylkill River shall meet the substantive discharge requirements of the NPDES program under the Clean Water Act, and shall comply with discharge rates established by EPA in consultation with PADER and DRBC.

(e) Periodic Monitoring and System Shutdown

A long-term groundwater monitoring program shall be implemented to evaluate the effectiveness of the groundwater pumping and treatment system throughout the entire plume. Numbers and locations of these monitoring wells shall be approved by EPA during the remedial design, in consultation with the PADER. The wells shall be sampled quarterly for the first three years and semiannually thereafter until the levels of contaminants of concern in these wells have reached background levels as established by EPA, in consultation with PADER during the Remedial Design, or MCLs whichever is lower. Once these required levels have been reached, the wells shall be sampled for twelveconsecutive quarters throughout the entire plume and if contaminants remain at or below these required levels, the operation of the extraction system may be shut down.

Semi-annual monitoring of the groundwater shall continue for five years after the system is shut down. If subsequent to an extraction system shutdown, monitoring shows that groundwater concentrations of any contaminant of concern are above background levels or MCLs, whichever is lower, the system shall be restarted and continued until the required levels have once more been attained for twelve consecutive quarters. Semi-annual monitoring shall continue until EPA determines, in consultation with the PADER, that contaminants have met previously specified performance standards. An operation and maintenance plan for the

groundwater monitoring system shall be required, and must be approved by EPA in consultation with the PADER.

(f) Operation and Maintenance of Extraction and Treatment System

Operation and maintenance of the groundwater extraction and treatment system shall be required in order to assure that it performs according to the EPA-approved design. The performance of the groundwater extraction and treatment system shall be carefully monitored on a regular basis and the system may be modified, as warranted by the performance data collected during operation. Samples of treated groundwater shall be collected periodically to ensure that the treatment technologies employed are reducing contaminant levels to required standards. These modifications may include, for example, alternate pumping of extraction wells or the addition or elimination of certain extraction wells. A plan shall be developed to accomplish the above specified operation and maintenance requirements.

(2) Institutional Controls

Institutional controls, in the form of deed restrictions will be placed on the deeds to the properties that comprise the on-site ground water where contaminants remain above Performance Standard levels. The institutional controls are needed to prevent the use of on-site ground water for a drinking water source. Additional deed restrictions will be implemented to limit the use of the Site to industrial use only. In addition, continued monitoring of specified wells and periodic reevaluation of remedial technologies for ground water restoration are also required.

(3) Worker Safety

During all Site work, Occupational Safety and Health Administration ("OSHA") standards set forth at 29 C.F.R. Parts 1910, 1926 and 1904 governing worker safety during hazardous waste operations, shall be complied with as required by the NCP.

(4) Five-Year Reviews

Five-year reviews shall be conducted after the start of the remedial action to assure that the remedy continues to protect human health and the environment. A 5-Year Review Work Plan shall be required and shall be approved by EPA in consultation with the PADER.

STRATEGY IF THE SELECTED REMEDY IS NOT ACHIEVED

Based on the information obtained during the RI, and the analysis of the remedial alternatives, EPA and the Commonwealth of Pennsylvania believe that it is possible to achieve the required groundwater cleanup levels. However, the ability to achieve required cleanup levels at all points throughout the area of attainment or plume of contamination cannot be determined until the extraction system has been implemented, operated, modified as necessary, and plume response monitored over time.

If it is determined by EPA, in consultation with PADER, that on the basis of the system performance data, that certain portions of the aquifer cannot be restored to background levels, or MCLs, whichever is lower, and/or if EPA determines that it is technically impracticable to restore the aquifer, EPA may amend the ROD or issue an Explanation of Significant Differences in accordance with the NCP. In such event, the likely alternative actions will attempt to remediate the groundwater to its beneficial use, i.e. a drinking water source. If, however the aquifer cannot be restored to its beneficial use, some or all of the following measures involving long-term management could occur, as determined by EPA in consultation with PADER, for an indefinite period of time, as a modification of the existing system:

- long term gradient control may be provided by low level pumping, as a containment measure;

- chemical-specific ARARs may be waived for those portions of the aquifer for which EPA and PADER determine that it is technically impracticable to achieve further contaminant reduction;

- institutional controls may be provided/maintained to restrict access to those portions of the aquifer where contaminants remain above Performance Standards;

- remedial technologies for groundwater restoration may be reevaluated; and

- further sampling and/or monitoring of existing and/or new wells may be ordered.

B. General Description of the Selected Earthen Lagoon Remedy

Following review and consideration of the information in the Administrative Record file, the requirements of CERCLA and the NCP, and public comment, EPA has selected Alternative 2, (Onsite Drying of PVC Layers and Landfilling of the Coal Fines Layer), for the removal of the earthen lagoons at the OCC Site.

Alternative 2 meets the threshold criteria of overall protection of human health and the environment and compliance with ARARs, and provides the best balance of long term effectiveness and permanence, reduction of toxicity, mobility or volume of contaminants through treatment, short term effectiveness, implementability and cost.

The selected remedy for the earthen lagoons consists of the following components:

- Construction of an access road to the earthen lagoons

- Excavation of PVC material (which includes all PVC sludge), coal fine layers and contaminated soil

- Storage hopper for excavated materials

- On-site drying PVC material with air pollution controls

- Dried PVC material shall be bagged, stored, and recycled

- Sampling and analysis as approved by EPA for transportation and disposal of bottom coal fines layer of lagoons, including residuals

- Sampling and analysis of underlying soils as approved by EPA to document removal of chemicals of concern to background concentrations

- Restoration of the area to original grade which includes backfilling excavations with clean fill

- Institutional Controls

PERFORMANCE STANDARDS

(1)  All PVC Material (white and gray layers) contained in the earthen lagoons shall be dried on-site and recycled in accordance with the following:

(a)  The PVC Materials which comprise approximately 31,000 cubic yards of lagoon materials shall be excavated and transported out of the floodplainfor onsite drying.  Prior to the start of the removal of the material, an access road shall be built which supports the weight of loaded dump trucks and excavation equipment.  Vegetation which has grown on the lagoon surface shall be removed prior to excavation of the white layer.  Any possible impacts on wetlands shall be identified, and impacts on wetlands shall be minimized and mitigated, pursuant to a plan approved by EPA.  All material identified as white and gray layers, coal fines, and contaminated soil shall be excavated.  Once excavated, the PVC material shall be dried on-site and bagged.  The bagged material shall be stored out of the floodplain until the reclaimed materials are marketed for sale to be reused in applications such as electrical conduit, or sewer pipe.

(b)  Recycling of the PVC Material shall ensure that hazardous substances, pollutants, and contaminants within the final recycled product ("Final Product") are inseparable from the Final Product.  The PVC Material and any residuals shall be tested in accordance with procedures authorized under RCRA to determine whether such materials exhibit RCRA hazardous characteristics.

(2)  The PVC material shall be dried so that the material is appropriate for recycling and does not exhibit RCRA characteristics.  The dryer shall be operated so that air emissions from the dryer meet the appropriate requirements as set forth at 40 C.F.R. Part 264, Subpart AA - Air Emission Standards for Process Vents.  In addition, the dryer shall be operated to comply with the Commonwealth of Pennsylvania regulations set forth at 25 PA Code, Chapter 127, Subchapter A.

(3)  Dried material shall be bagged and stored in a manner that does not contribute to any further site contamination, and does not cause any release or threat of release of hazardous substances.

(4)  Residuals from the recycling process, and PVC material from the lagoon perimeter that EPA determines cannot be recycled, shall be tested to determine whether such residuals exhibit RCRA hazardous characteristics. Recycling residuals that do not exhibit RCRA hazardous characteristics shall be disposed of in an appropriate off-site landfill.

(5)  Residuals that do exhibit RCRA hazardous characteristics shall undergo treatability tests so that EPA can determine the most appropriate method of treatment prior to land disposal.  These materials shall then be treated so that such materials no longer exhibit RCRA hazardous characteristics and shall then be disposed of in an appropriate off-site landfill.

(6)  Coal fines underlying the PVC sludge shall be excavated, analyzed for RCRA Characteristics and transported off-site for appropriate disposal. Sampling and disposal requirements shall be approved by EPA in consultation with PADER.

(7) Following removal of the PVC sludge and coal fines, sampling and analysis of the underlying soils shall be performed to document complete removal of the lagoon contents.

(8) The restoration shall include removal of the constructed access road and revegetation of all restored areas with native grasses and herbs. If wetlands are impacted, they shall be fully restored, according to a restoration plan approved by EPA in consultation with PADER.

(9) Institutional Controls in the form of deed restrictions shall be placed on the deeds to the properties to limit the use of the Site to industrial use only.

C. General Description of the Selected Drainage Swale and Sedimentation Pond Remedy

Following review and consideration of information in the Remedial Investigation, EPA shall require additional sampling to define the extent of cleanup required for the contaminated sediment found in the Sediment Pond and Drainage Swale during remedial design. The sediment shall be remediated to levels equivalent to the maximum Schuylkill River sediment background concentration detected during the Remedial Investigation: PAHs - 5 ppm, dibenzofurans 0 ppm, PCBs - 0 ppm, and mercury - .4 ppm. In addition, further sampling of the floodplain to the south of the 17 acre landfill and sediment pond/drainage swale is required to determine whether migration of contaminants has occurred during flooding events.

The sediment pond and drainage swale are downgradient of the active 7-acre industrial waste landfill permitted by the State of Pennsylvania. Review of the report and photographs from the EPA June 1991 Site Analysis (TSPIC-90960) shows the potential for contaminants associated with other site activities (e.g., the closed landfill and areas of standing liquid and mounded material) to have been transported by storm water runoff to the pond and swale area.

Upon completion of the further sampling, a full assessment of environmental risk and development of remedial objectives shall be completed.

X. STATUTORY DETERMINATIONS

Section 121 of CERCLA requires that a selected remedy:

- be protective of human health and the environment;
- comply with ARARs;
- be cost-effective;
- utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and
- address whether the preference for treatment as a principal element is satisfied.

A description of how the selected remedies satisfy each of the above statutory requirements is provided below.

A. Protection of Human Health and the Environment

The selected remedies for the Site will be protective of human health and the environment by reducing the principal threat posed at the Site, by addressing the ground water contamination beneath the OCC Site and at the earthen lagoons: sludge and soil contamination. Potential health threats posed by the Site through exposure pathways (i.e. direct contact, ingestion of sludge, contaminated soils, sediments and contaminated ground water, and inhalation of ambient air) will be eliminated by the remedies selected in this ROD.

Contaminants in the ground water beneath the OCC Site will be remediated to background levels. PVC Material at the earthen lagoons will be excavated and recycled while the contaminated soil/coal fines at earthen lagoons will be excavated and transported off-site for disposal. Contaminated sediments at the Sediment Pond and Drainage Swale will be remediated to background levels found in the Schuylkill River.

B. Compliance with ARARs

All applicable or relevant and appropriate requirements (ARARs) pertaining to the selected remedies for the OCC Site will be attained. The ARARs are discussed in Sections VII, X and below.

Pumping and Treatment of Groundwater with Air Stripping and Carbon Vapor Phase Adsorption.

Contamination in the ground water beneath the OCC Site is required to be reduced to background levels by 25 PA Code 264.90 - 264.100, specifically 25 PA Code 264.97(i) and (j) and 264.100(a)(9). PADER's February, 1992, policy document, "Ground water Quality Protection Strategy," although not an ARAR is to be considered in the implementation of this remedy. This policy document defines the framework for ground water remediation programs. In the document, PADER states that its goal is "nondegradation of ground water quality" (p. 1), which means that the ultimate goal of all remediation projects is torestore levels to background quality. However, PADER recognizes that "there are technical and economic limitations to immediately achieving the goal of nondegradation for all ground waters" (pp. 1-2), and that levels above background may not present an unacceptable risk to human health and the environment. The background concentration for each contaminant of concern shall be established in accordance with the procedures for ground water monitoring in 25 PA Code 264.97, which shall be an ARAR for this remedy. The SDWA MCLs listed in Table 19 are also ARARs with which this remedy will comply.

Action-specific ARARs for the discharge of treated ground water will be met. Depending on the method of effluent discharge from the production treatment system, applicable NPDES or POTW pretreatment regulations will apply. If the effluent is discharged to the Schuylkill River, this remedy will comply with the substantive requirements of the Clean Water Act NPDES discharge regulations (40 C.F.R. 122.41 - 122.50 and 40 C.F.R. Part 131), the

Pennsylvania NPDES Regulations (25 PA Code 91 and 92.31), the Pennsylvania Water Treatment Regulations (25 PA Code 95.1 - 95.3 and 97), the Pennsylvania Water Quality Standards (25 PA Code 93.1 - 93.9). If the effluent is discharged to a Publicly Owned Treatment Works (POTW), this remedy will comply with 40 C.F.R. Part 403.

VOC emissions from any air stripping tower will be governed by the PADER air pollution regulations. Air Emissions will also comply with 40 C.F.R. Part 264, Subpart AA, Subchapter AA (Standards for Process Vents), and with 40 C.F.R. Part 264, Subpart BB, Subchapter BB (Air Emissions Standards for Equipment Leaks) and 25 PA Code Chapter 264. Air emissions of Vinyl Chloride will comply with 40 C.F.R. Part 61, Subpart F, National Emission Standards for Hazardous Air Pollutants (NESHAPS).

Air permitting and emissions ARARs are outlined in 25 PA Code Chapters 121, 123, 124, 127, 131, 135, and 139. 25 PA Code 127.12 requires all new air emission sources to achieve minimum attainable emissions using the best available technology ("BAT"). In addition, the PADER air permitting guidelines for remediation projects require all air stripping and vapor extraction units to include emission control equipment. However, the permitting regulations allow for exemptions if a source is considered to be of "minor significance," or if emission controls are not economically or technically feasible. Also to be considered at the Site are the PA Bureau of Air Quality Memorandum permitting Criteria for remediation projects involving air strippers and soil decontamination units. During design of the air stripping unit, PADER shall calculate from actual design flow rates and VOC loading rates whether emission controls need to be installed.

A vapor phase carbon adsorption shall be installed to ensure compliance with 112 of the Clean Air Act, 42 U.S.C. 7412, National Emission Standards for Hazardous Air Pollutants (NESHAPs). The relevant and appropriate NESHAP for vinyl chloride is set forth at 40 C.F.R. Part 61, Subpart F. OSWER Directive 9355.0-28 - Control of Air Emissions from Superfund Air Strippers at Superfund Ground water Sites although not an ARAR is to be considered for any air stripper used in this remedy.

Fugitive dust emissions generated during remedial activities will be controlled in order to comply with fugitive dust regulations in the federallyapproved State Implementation Plan for the Commonwealth of Pennsylvania, 25 PA Code 123.1 - 123.2, and will not violate the National Ambient Air Quality Standards for fugitive dust generated during construction activities, 40 C.F.R. 50.6 and 52.21(j) and 25 PA Code 131.2, 131.3, and 131.4.

This remedy will comply with the ground water monitoring requirements in 25 PA Code Chapter 264, Subchapter F.

Earthen Lagoon Excavation.
The remedy for the earthen lagoons will comply with the applicable portions of the PADER Ground Water Quality Protection Strategy, which prohibits continued ground water quality degradation, since all contaminated sludge and soil which could potentially impact the ground water will be excavated for either onsite recycling or off-site disposal.

Onsite treatment (recycling), storage will comply with RCRA regulations 40 C.F.R. Part 264 and standards for owners and operators of hazardous waste treatment, storage and disposal facilities.  It will also comply with 25 PA Code Chapter 264.

Determinations about the effectiveness of any soil remediation at the Site shall be compared with EPA document no. 230/02-89-042, Methods for Evaluating Cleanup Standards, Vol. I:  Soils and Solid Media, although not an ARAR for the Site, this document shall be considered.

Excavation of the earthen lagoon materials may impact the adjacent wetland area. This Alternative will consider the provisions for protection of wetlands and flood plain management in 40 C.F.R. Parts 6 (Executive Order 11988 "Floodplain Management 230, Guidelines for Specification of Disposal Sites for Dredged Material" and 230 and 25 PA Code 105.17-105.20(a).  In addition, it will comply with erosion control requirements related to excavation activities in 25 PA Code Chapter 102.

Fugitive dust emissions generated during remedial activities will be controlled in order to comply with fugitive dust regulations in the federallyapproved State Implementation Plan for the Commonwealth of Pennsylvania, 25 PA Code 123.1 - 123.2, and will not violate the National Ambient Air Quality Standards (NAAQS) for particulate matter, 40 C.F.R. 50.6 and 25 PA Code 131.2, 131.3, and 131.4.

This remedy will comply with the ground water monitoring requirements in 25 PA Code Chapter 264, Subchapter F.  Compliance With Other Laws

Any off-site disposal or treatment as a result of this remedy will comply with regulations for the generation and transportation of hazardous wastes, 25 PA Code Chapter 262, Subchapters A and C, and Chapter 263.  It shall also comply with the RCRA regulations and standards for owners and operators of hazardous waste treatment, storage and disposal facilities, 25 PA Code Chapter 264.

Pennsylvania Solid Waste Management Act, Act 97 which is applicable to remedial actions involving storage, collection, transportation, processing, treatment, and disposal of solid waste.

This remedy would comply with CERCLA 121(d)(3) and with EPA OSWER Directive #9834.11, both of which prohibit the disposal of Superfund site waste at a facility which is not in compliance with 3004 and 3005 of RCRA and all applicable State requirements.

Occupational Safety and Health Act (OSHA) Regulations (29 CFR Parts 1904, 1910, and 1926) provide occupational safety and health requirements applicable to workers engaged in onsite field activities.  The regulations are applicable to onsite work performed during the implementation of a remedial action.

Department Of Transportation (DOT) Rules for Hazardous Materials Transport (49 CFR Parts 107 and 171-179) regulate the transport of hazardous materials, including packaging, shipper equipment, and placarding.  These rules are applicable to wastes such as those shipped off-site for treatment or disposal. Potential applications of the DOT rules apply to the Site if offsite drying occurs or off-site disposal of lagoon materials occurs.

C. Cost-Effectiveness

The estimated present worth cost of the selected remedy for the ground water contamination beneath the OCC Site (ground water pumping and treatment combined with air stripping and carbon vapor adsorption) is $7,100,000.

The estimated present worth cost of the selected remedy for the earthen lagoons (Onsite drying of PVC layers and Landfilling of Coal Fines Layer) is $4,019,000. If the coal fines material require hazardous waste disposal, the estimated present worth cost of the selected remedy is $5,300,000.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the selected remedies represent the maximum extent to which permanent solutions and treatment technologies can be utilized while providing the best balance among the other evaluation criteria. Of the alternatives evaluated that are protective of human health and the environment and meet ARARs, the selected remedies provide the best balance of tradeoffs in terms of long-term and short-term effectiveness and permanence, cost, implementability, reduction in toxicity, mobility, or volume through treatment, State and community acceptance, and preference for treatment as a principal element.

The selected remedy for the contaminated ground water beneath the OCC Site, pumping and treatment with air stripping and carbon vapor adsorption is a proven technology.

The selected remedy for the earthen lagoon materials will provide a higher degree of treatment and a lower residual contamination than the other Alternatives evaluated.

E. Preference for Treatment as a Principal Element

Ground water pumping and treatment combined with air stripping and carbon vapor phase adsorption of the contaminated ground water at OCC Site fulfills the statutory preference for remedies that employ treatment as a principal element.

Onsite drying of the earthen lagoon materials fulfills thestatutory preference for remedies that employ treatment as a principal element.

## XI. EXPLANATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Occidental Chemical Site was released for public comment on April 20, 1993. The Proposed Plan identified Groundwater Alternative 2A (Groundwater Pump & Treat Before the Production Process with Air Stripping and Vapor Phase Carbon Adsorption) and Earthen Lagoon Alternative 2 (Onsite Drying of Lagoon Materials and Landfilling of Coal Fines Layer) as EPA's preferred Alternatives for ground water and earthen lagoon remediation. The selected remedy described in this ROD differ from the remedy in the Proposed Plan with regard to the following:

1) Upon receipt of comments by the Department of Interior during the public comment period, EPA has determined that the Sediment Pond and Drainage Swale require sediment cleanup. In order to remediate the Sediment Pond and Drainage Swale, further sampling is required to characterize the extent of contamination. In addition, sampling is required in the floodplain area to the south of the seventeen acre landfill to determine if migration of contaminants has occurred during flooding events. Upon completion of sampling, an environmental risk assessment with remedial standard may be developed, if appropriate, which would then be set forth in a future ROD for this Site.

Responsiveness Summary
Occidental Chemical Corporation Superfund Site
Lower Pottsgrove, Montgomery County, Pennsylvania

This Responsiveness Summary documents public comments received by EPA during the public comment period on the Proposed Plan for the Occidental Chemical Corporation Site ("the Site"). It also provides EPA's responses to those comments. The Responsiveness Summary is organized as follows:

SECTION I     Overview
This section summarizes recent actions at the Site and the public's response to the remedial alternatives listed in the Proposed Remedial Action Plan (Proposed Plan). The Proposed Plan outlines various cleanup alternatives available to address Site contamination and highlights EPA's preferred alternative.

SECTION II    Background on Community Involvement
This section reviews the history of community interest and involvement in the Occidental Chemical Corporation Superfund Site.

SECTION III   Summary of Major Comments and Questions Received During the Public Meeting and EPA's Responses
This section documents comments and questions from the public regarding the Site and EPA's responses to them.

SECTION IV    Summary of Written Comments and Questions Received During the During the Comment Period and EPA's Responses
This section documents written comments and questions from the public regarding the Site and EPA's responses to them.

I. Overview

The public comment period on the Proposed Plan for the Site began on April 20, 1993, and ended on May 19, 1993. EPA held a public meeting at the Pottstown Senior Center on May 4, 1993.

At the meeting, EPA representatives summarized the results of the Remedial

Investigation ("RI"), Feasibility Study ("FS"), and the Baseline Risk Assessment ("BRA") performed for the Site. EPA presented the preferred alternative to address Site contamination. The Proposed Plan addressed two areas of contamination: bedrock ground water and earthen lagoons. The preferred cleanup alternative for the contaminated bedrock ground water would involve extraction of the water using recovery wells and treatment through an air stripper with vapor phase carbon adsorption. The preferred cleanup alternative for the earthen lagoons would involve constructing an access road, drying the white and gray layers of polyvinyl chloride (PVC) material onsite for recycling and transporting coal fines and contaminated soil to an appropriate disposal facility.

The public was given an opportunity to ask questions or submit written comments on the cleanup alternatives outlined in the Proposed Plan and the results of the Remedial Investigation for the Site. The comments and EPA's responses are documented in Section III and IV of this document. The transcript of the public meeting is contained in the Administrative Record for the Site. In general, the public which expressed opinions supported EPA's Preferred Alternative to cleanup the Occidental Chemical Site.

## II. Background on Community Involvement

The Occidental Chemical Corporation Superfund Site is located 1/2 mile southeast of the Borough of Pottstown, Montgomery County, Pennsylvania. In February 1991, EPA conducted community interviews with local residents and officials to determine public awareness and concerns about the Occidental Chemical Corporation Site. EPA used these community interviews to develop a Community Relations Plan. The Community Relations Plan addresses community concerns about the Site and guides two-way communication between EPA and the Site community. Residents and local officials expressed concern about the impact of Site contamination on the community. The major concerns included: ground water contamination spreading off-site, health hazards associated with contamination, hazardous waste disposal procedures, and reduced real estate values in the area. The interviews revealed that community members were generally unfamiliar with the Site and the Superfund process.

In August 1991, EPA held a public meeting to discuss the Superfund process and future activities planned at the Site. Attendance at this meeting was low and consisted of mostly local officials. EPA distributed informational fact sheets in February 1991, and in April 1993 to update the community on cleanup work at the Site.

## III. Summary of Major Comments and Questions Received During the Public Meeting and EPA's Responses

### PROPOSED REMEDIAL ACTION PLAN

1. When will the clean up be started?

EPA Response: It is estimated that actual construction will begin in 1995. Upon the close of the public comment period, EPA will review all Site-related comments and questions submitted during the comment period and voiced at the May 4, 1993 public meeting and issue a Record of Decision. EPA then intends to give the parties responsible for the contamination an opportunity to conduct the cleanup, and engineers will prepare plans and technical specifications to implement the cleanup.

GROUND WATER CONTAMINATION

1. Will there be an incinerator on site?

EPA RESPONSE: No. During the public meeting an EPA representative described the regeneration of the carbon adsorption units as a form of incineration. In actuality, when carbon is regenerated it is heated in a kiln-like apparatus to release the contaminants from the carbon. The contaminants may be completely destroyed; however those that are not are then trapped in a pollution control device on the kiln. The residuals which may be trapped in the pollution control device are handled as a RCRA hazardous waste and disposed of appropriately.

2. Is the trichloroethylene (TCE) found in the ground water a cancer risk?

EPA RESPONSE: Yes. According to the Site Risk Assessment, there is a cancer risk associated with drinking the ground water. However, there is no current use of the ground water as drinking water. The risk exists from the potential migration of the water to residential wells north of the Site, to the Schuylkill River or under the river to residential wells south of the Site or to future use of the ground water at the Site. Also, EPA believes that the contaminated ground water would migrate to the residential wells if the Occidental Chemical Corporation shut down their wells.

3. Why is vinyl chloride present in any measurable amount when it is so volatile? Is it bound up in the solids?

EPA RESPONSE: Vinyl chloride is dissolved in the ground water. EPA believes that it is a result of the break down of trichloroethylene (TCE) that occurred beneath the ground in the water. Recently, the concrete settling basins located in the wastewater treatment plant on the Site have been identified as a potential source of vinyl chloride contamination. Occidental is currently upgrading these basins to prevent leakage.

4. Is Occidental Chemical Corporation monitoring the ground water wells?

EPA RESPONSE: Yes, Occidental Chemical Corporation is monitoring the wells. EPA oversees this monitoring process.

5. How is the contaminated ground water is being processed now and where the discharge is going?

EPA RESPONSE: Occidental Chemical Corporation is pumping the ground water from the wells and using it in its production process. After the production process, the ground water passes through the waste water treatment system which settles out the PVC solids. The ground water then passes through an air stripper to remove the volatile organic compounds and is discharged to the Pottstown Publicly Owned Treatment Works (POTW).

6. Is there a contingency plan in case the carbon unit doesn't adsorb the compound?

EPA RESPONSE: Yes, two carbon units will be on site for that particular reason. When the first carbon unit becomes saturated with volatile organic compounds it will be regenerated onsite. While the first unit is regenerated, a second unit will be utilized. Also, the equipment will have routine maintenance to ensure proper operation.

7. Will the vapor phase carbon adsorption unit be installed into the air stripper that is already present?

EPA RESPONSE: No, the air stripper that is currently operating onsite receives the ground water after it has been utilized in Occidental's production process. EPA has determined that the ground water should be treated before the production process with a new air stripper. Once treated, the water could enter the production process and go through the existing wastewater treatment which includes an air stripper before discharge to the POTW or the Schuylkill River.

8. Is EPA going to operate this system even if Occidental closes?

EPA RESPONSE: EPA intends to ensure that either one or more of the responsible parties will operate the systems, no matter what happens to Occidental's production. If no responsible party can conduct the cleanup, it is possible that EPA or the State could take over the clean up.

9. How many years will it take to clean up the groundwater?

EPA RESPONSE: A current ground water model developed by Occidental shows that to restore this water supply to drinking water quality it could take 100 years. However, this system will be monitored to determine if the plumes respond to the treatment. A long term ground water monitoring program will be implemented. The wells will be sampled quarterly for the first three years and semi-annually thereafter until the levels reach background. If the performance data indicate that the portions of the aquifer cannot be restored, and EPA determines that it is technically impracticable to restore the aquifer, EPA may amendthe ROD or issue an Explanation of Significant Differences in accordance with the NCP. This is further discussed in Section IX, #4, of the ROD.

10. What will be done with the extra water that is pumped from the additional wells?

EPA RESPONSE: The remedy selected does not pump additional volume. The wells will continue to supply Occidental with process water but they will be pumped at lower rates to optimize the collection of contaminated water.

11. Has EPA considered new technologies in dealing with TCE contamination ? For example, using microbes to remediate the TCE in the groundwater.

EPA RESPONSE: Yes, EPA has considered various technologies in the remediation of the groundwater. One of the technologies that was considered was insitu bioremediation. This involves altering the subsurface environment to accommodate a colony of microbes which then metabolize the organic waste. Specific nutrients must be present as well as suitable hydrogeology. This use of this technology is typically applied to soils and its use in fractured bedrock, which exists at this site, is unproven.

EARTHEN LAGOON CONTAMINATION

12. Where will the earthen lagoon material be landfilled ? Will it be disposed on site ?

EPA RESPONSE: EPA does not know the exact location of the off site landfill. This location will be determined during remedial design. The material will not be landfilled on the Occidental Site. The only material that is proposed for landfilling is the coal fines layer at the bottom of the lagoons and any contaminated soil. Depending on the classification of the coal fines and soils, the material will be landfilled in either a hazardous waste, residual waste or solid waste landfill.

13. What will be done with the old landfill on site ?

EPA RESPONSE: No additional work will be performed at the old landfill (17 acre closed landfill). It was closed in 1985 under a Pennsylvania Department of Environmental Resources (PADER) closure plan. The landfill is covered with an impermeable liner and surrounded by monitoring wells. Samples taken from those wells have shown that the groundwater has not been impacted by the closed landfill.

IV. Summary of Written Comments and Questions Received During the Public Meeting and EPA's Responses

GROUND WATER CONCERNS

Comments submitted by the Borough of Pottstown and the Township of Lower Pottsgrove expressed the following concerns:

14. The pump & treat requirement will unnecessarily burden the current property owners and certainly those who might consider an investment in this property in the future.

EPA RESPONSE: EPA disagrees that the cleanup will unnecessarily burden the current property owner. The properly remediated site will be a far better investment than an unaddressed contaminated site.

15. This burden of operating the pump and treat system will eventually result in the public agency assuming responsibility for its continuance. It is likely that it will result in the responsibility of the local government.

EPA RESPONSE: Operation and Maintenance at this Site will remain the responsibility of the responsible parties. See Response #8.

16. What happens if there is a change in ownership ? Would anyone desire to purchase this site within the next 100 years if this pumping requirement goes along with ownership ? Or what happens is a future owner fails to continue the pumping ? Will it become the responsibility of the Township ?

EPA RESPONSE: A change in ownership would not affect the operation and maintenance of the pump and treat system. The responsible parties would still be required to continue the O & M. If all of the responsible parties were financially incapable of containing the O & M, the Commonwealth of Pennsylvania would be asked to assume the responsibility.

17. The performance standard that Occidental is required to meet is higher than the standard that is required for human consumption drinking water.

EPA RESPONSE: The performance standard for each contaminant of concern is the Maximum Contaminant Level (MCL) which is the federal standard for drinking water supplies, or the background concentration, whichever is lower. In the event that the contaminants of concern are not detected in the background samples, the method detection limits of EPA-approved low level drinking water analytical methods will constitute background for each specific contaminant. Therefore, it is possible that the background levels established are more stringent than MCLs. However, this is a requirement of the Commonwealth State of Pennsylvania's Ground Water Quality Protection Strategy which will be followed in the implementation of this remedy.

18. If EPA is concerned that this water eventually may be used for human consumption, an alternative that is less expensive and readily available would be to extend water lines to any resident or land use impacted by the contaminated plume.

EPA RESPONSE: The Site currently does not impact the water supply. However, the potential threat from the Site to impact human health and the environment requires remedial action. The mandate of the Superfund program is to protect human health and the environment from the current and potential threats posed by uncontrolled hazardous waste sites and to restore groundwater to its beneficial use. Thus, the currently existing contamination has impacted an important ground water resource, which local residents may need to use for drinking water in the future. Remedies that protect human health and the environment can be fulfilled through a variety or combination of means. These means include the recycling or the destruction, detoxification, or immobilization of contaminants through the application of treatment technologies. Protection can also be provided in some cases by controlling exposure to contaminants through engineering controls (such as containment) and/or institutional controls which prevent access to contaminated areas. However, treatment is the preferred method of attaining protectiveness, wherever practicable.

The following comments were submitted by the Occidental Chemical Corporation:

19. The Proposed Plan should be modified to show landfilling of the earthen lagoon material (Alternative 4) as the preferred option. This is based on a review of recent market conditions which showed that the demand for the reclaimed product from the earthen lagoons is low, and therefore likely that the dried material would need to be stored for an extended period of time. Current market conditions create the situation wherein direct landfilling will be less costly and more time-efficient to complete, thus, direct landfilling becomes the preferred alternative.

EPA RESPONSE: EPA disagrees that landfilling of the lagoon material should be the preferred alternative. Occidental has not provided any supporting information which substantiates the recent market conditions or, which market they are concerned about.  It is possible that alternative markets could be developed for this material.  In addition, EPA believes that further characterization of the PVC material is required to ensure that it is not a RCRA characteristic waste.  If landfilling were to be considered additional sampling would be warranted to meet disposal requirements.

20.  The Site is said to be "3 miles" southwest of the PottstownBorough on page 1 of the Proposed Plan, and "1/2 mile" on page 2.  The Site is 1/2 mile from the borough boundary and approximately 3 miles from downtown Pottstown.

EPA RESPONSE:  EPA acknowledges this discrepancy and will clarify this in the Record of Decision.

21.  Page 4, Earthen Lagoons:  The last sentence states that the underlying soils and coal fines layer have been classified as non-hazardous. It should also be stated that the gray and white material layers have been tested and the material is not classified as hazardous.

EPA RESPONSE:  The Proposed Plan states that as a result of the RI Sampling the underlying soils and coal fines layer have been classified as nonhazardous.  It also states that the lagoon material is not a hazardous waste as defined by RCRA.

However, it must be clear that the lagoon material is to be recycled.  If recycling were not the remedy, additional sampling would be warranted to characterize the material for disposal to make sure that it is not a characteristic hazardous waste.  The coal fines and soil will require additional sampling in the remedial design prior to disposal.  The results of that sampling will determine the appropriate disposal method.

22.  Page 5, Ground Water Alternatives:  First, the presentation of Alternatives 2A and 3A indicate that groundwater would be pumped at approximately 410 gpm when either the air or steam stripper is placed before the plant's production process.  The groundwater modeling for the FS showed that 410 gpm is the expected maximum pumping rate from the wells within the remediation capture zone; a design start-up pumping rate of 335 gpm was recommended, with the potential to adjust rates based on performance of the system.

Secondly, the presentation of alternative 2B and 3B indicate that the ground water would be pumped at rate of 620 gpm if either stripper isplaced after the process.  The 620 gpm was a combination of flow from the remediation recovery wells and additional production wells required to meet peak demands in the process operations.  As presented in the modeling report, the 620 gpm included groundwater pumped from wells outside the remediation zone which were distant enough from the remediation recovery wells.  Within Alternatives 2B and 3B, the groundwater obtained from within the remediation capture zone would be supplemented by water from wells outside the zone. The stripper units for Alternatives 2B and 3B were thus designed to handle a larger flow (620 gpm) than 2A and 2B designs (410 gpm) because of the combined groundwater sources at the point of treatment.

EPA RESPONSE:  EPA acknowledges this clarification, however, operation of

Occidental's process is irrelevant to the operation of the remedy. These pumping rates are presented as estimates only. Actual pumping rates and configurations will be determined when the selected remedy is designed.

23. Page 5, Ground Water Alternatives: The proposed plan states that the preferred groundwater remediation alternative has an approximate 100-year duration. It should be noted that the modeling performed by Occidental shows the 5 VOC plumes will be so significantly reduced within the first 25 years such that the risk associated with the concentration of 2 chemicals which will still be detectable at that time will be in an acceptable range (i.e. 1 X 10-4 to 1 x 10-6).

EPA RESPONSE: EPA has expanded its explanation of the Ground Water Alternatives in the Record of Decision. However, the cleanup is required to meet the PADER Groundwater Quality Protection Strategy. The purpose of the cleanup is to restore the impacted ground water, so that it can be used as a safe drinking water source in the future. See Response #17.